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ELECTRIC POWER

ATOMIC ENERGY FOR PEACEFUL USE

Moscow EKONOMICHESKOYE SOTRUDNICHESTVO STRAN-CHLENOV SEV in Russian
No 3, 1981 pp 84-86

/Article by Aleksandr Panasenkov, chief of a department of the CEMA secretariat, and Lev Korotkov, CEMA secretariat: "The Development of Scientific-Technical Cooperation of the CEMA Nations in Key Sectors of Industry: Some Results of Completing the Comprehensive Program for the Use of Atomic Energy for Peaceful Purposes"/

/Text/ The extensive cooperation of the CEMA nations is playing an increasing role in dealing with the task laid out in the Comprehensive Program - to speed up the development and efficient adoption into the national economy of atomic energy on an industrial scale. This cooperation has had a substantial influence upon the formation and successful realization of national programs for the development of atomic energy. The calculations and designing of water cooled reactors, the optimization of the water regimes of atomic power stations (AES), of systems for monitoring and controlling reactors and ensuring their reliability and safety which were accomplished in the course of this cooperation, have made it possible to assimilate the series production of VVER-440 reactors and other AES equipment. This has also made it possible to create the conditions for the rapid growth of this new and very promising sector of the national economy.

At present with the technical assistance of the Soviet Union the following AESs were built and are now successfully operating: "Kozloduy" in Bulgaria, "Raynsber" and the AES imeni Bruno Loishner in East Germany, and an AES in Yaslovskiye Bogunitsy in Czechoslovakia. The total capacity of the AESs in these countries and in the USSR during the period 1971 through 1980 increased from 1,100 to 17,800 MW. The construction of an AES in Romania is now being completed. Work is now underway to start work on atomic electric power stations in several other CEMA nations.

An important stage in cooperation, which was stipulated in the Comprehensive Program, is to draw up a joint forecast of the development of atomic energy. In accordance with this Program an optimal way to do this is to create and put into operation fast-neutron breeders, which provide an expanded reproduction of nuclear fuel. The solution of this problem will make it possible to improve the structure of the

sector and by the year 2,000 to achieve a 30 percent reduction in the expenditure of natural uranium.

The present-day stage of cooperation is characterized by the concentration of efforts of the CEMA nations on solving crucial problems in the atomic power industry. These problems were stipulated by the Coordinated Plan of multilateral integrated measures and DTsPS in the field of energy, fuel and raw materials. The task consists of assimilating power units with water-cooled reactors with a rated capacity on the order of 1,000 MW and the further improvement of such reactors; the development of large capacity fast-neutron reactors with a sodium heat-transfer agent and the use for this of dissociating gases.

In June 1980 agreements were signed to deal with these problems and programs of cooperation were agreed upon. The realization of these agreements will ensure that the national economies of the CEMA nations have power carriers and the latest achievements of science and technology are assimilated.

An agreement, which was signed by Bulgaria, Hungary, East Germany, Poland, Romania, the Soviet Union, Czechoslovakia and Yugoslavia on 28 June 1979 at the 33rd Session of the CEMA Congress, is aimed at carrying out this task. This agreement calls for multilateral international specialization and cooperation in production and mutual deliveries of equipment for atomic electric power stations during the years 1981 through 1990..

In accordance with the agreement approximately 50 percent of the basic equipment is to be manufactured in the Soviet Union. The remaining 50 percent is to be produced as follows: Czechoslovakia is to manufacture power reactors, steam turbines, separator-super heaters, and feed pumps; Romania is to manufacture emergency equipment protection systems and bridge cranes; Poland is to manufacture volume compensators, heat exchange equipment and reserve diesel electric power units; East Germany is to manufacture bridge cranes; Hungary is to manufacture overload equipment and special water treatment units; Bulgaria is to manufacture biological protection equipment, condensate, axial-flow and artesian pumps; Yugoslavia is to manufacture bridge cranes and feed and special pumps.

An important sector of cooperation is the development of atomic thermal electric power central systems (ATETs) and atomic heating supply stations (AST) for producing industrial steam and to supply heat. This cooperative effort was stipulated in the DTsPS.

At present the development of scientific-technical ties has made it possible to complete a set of neutron-physical, thermohydraulic and dynamic estimates on VVER-440 and VVER-1000 reactors, to create equipment for diagnosing AES equipment, and to achieve significant results in the research of the durability characteristics of construction materials and welded connections, which have been used in the manufacture of water-cooled reactor housings. In 1977 work on the physics of shielding AES reactors was completed.

Especially promising is the cooperation between the CEMA nations on the problem of fast-neutron reactors. This cooperation began in 1972. Within eight years the CEMA nations have organized scientific collectives and have constructed experimental test stands, and have established a scientific and material base for successful work in this field.

A major success was the start up in 1980 at the Beloyarskaya AES in the USSR of a 600 MW fast-neutron reactor, which in its economic parameters approaches the AES with thermal reactors.

Since 1972 the work of the Temporary International Collective (VMK) has been proceeding successfully in performing reactor-physical work on the critical assembly of the VVER (the Central Institute of Physical Research of the Hungarian Academy of Sciences). On such an assembly (zero power reactor) work has been completed on a cycle of statistical measurements on homogeneous and nonhomogeneous fuel grids. As a result a great deal of experimental data has been accumulated, which make it possible to make a reliable check of any rated model of reactors of the VVER type. The rebuilding of the critical ZR-6 assembly was also accomplished; this made it possible to expand its experimental possibilities and to perform research at high temperatures.

The VMP made a substantial contribution to solving the complex problems of the physics of nuclear reactors. The collective's work is used to design, operate and improve VVER power reactors.

During the course of the cooperation on matters dealing with what to do with the expended nuclear fuel and neutralizing radioactive wastes, equipment and technological diagrams were compiled which showed how to process the irradiated fuel of the thermal and fast-neutron reactors. Work was also done on the creation and standardization of means for transporting the expended fuel. The CEMA Executive Committee prepared and approved the Rules for the safe transport of the expended fuel from the AESs of the CEMA nations by railroad. Technology and equipment for processing and solidification of radioactive wastes and methods and means for decontaminating AES equipment and facilities were developed.

Plans for the production of isotope product were successfully coordinated between the CEMA nations. An agreement was reached on multilateral international specialization and cooperation in the field. This agreement has had a positive influence upon the growth of trade turnover between the nations and upon the expansion of foreign trade cooperation and raising the quality of the product being exported. Within a five-year period that the agreement has been in effect, the product list of manufactured articles covered in the agreement has increased significantly and now includes 1,333 designations. Under its terms Hungary is to produce 61 articles, East Germany - 268 articles, Poland - 83 articles, Romania - 112 articles, the USSR-- 653 articles, and Czechoslovakia - 156 articles.

A key direction of the cooperation is the practical use of controlled thermonuclear synthesis (UTS). In 1979 the CEMA Standing Commission on cooperation in the use of atomic power for peaceful purposes approved a program of scientific-technical ties in this field to the year 1990. The primary purpose of the program is to carry out joint scientific-research and experimental-design work on creating a new source of energy based on units like the TOKAMAK.

Toward this end it is planned to:

carry out joint work on existing units to study ways to obtain plasma with thermonuclear parameters, to devise methods of measuring its parameters, research the laws of performing, and checking and processing various engineering solutions;

create a TOKAMAK-15 unit and use it for joint research for obtaining plasma with thermonuclear parameters and for confirming the scientific feasibility of solving UTS problems and processing individual engineering solutions of the TOKAMAK thernonuclear power reactor;

and develop promising designs of thermonuclear reactors based on TOKAMAK units.

Recently the multilateral cooperation between the CEMA nations began to also include questions of superconductivity. A generation of super conductive magnetic systems has been created for the laboratory, which are combined with electronic cryogenic support systems. This new generation of equipment is equal to the best in the world. The results are being used in acceleration technology, in high energy physics and in thermonuclear research.

The scientific-technical cooperation in nuclear instrument building is of great importance. This is being done with an eye to the further development of power reactors, the need to modernize and expand the pool of nuclear equipment for scientific, industrial and medical purposes. The rapid growth of electronics and computers has opened up new prospects. It has predetermined the development of the nuclear instrument building based on a unified element base and computers.

At the present time equipment has been developed for control and shielding systems, for dosimetric control of water-cooled reactors, for a unified classification of articles of nuclear instrument building, and for the principles of constructing electro-physical equipment based on the KAMAK standard. The results of these work undertakings are now being used to raise the technical quality of VVER-440 and VVER-1000 reactors.

Work is underway to create equipment for nuclear medicine; this equipment will be used primarily to detect malignant tumors. The primary goal in improving this equipment is to increase the sensitivity and efficiency of detecting and processing signals. It will make it possible to reduce the time of research and to minimize the radiation load on the patient and medical personnel.

Within the framework of the cooperation recommendations have been prepared on the efficient use of radioisotope methods and devices in various sectors of the national economy. A standard documentation has been developed, which defines a unified approach to questions having to do with the arranging, operation and economic effectiveness of radiation-technological units for obtaining new materials, increasing the effective yield of agricultural crops, preventing the spoilage of food products, sterilizing medical articles, and cleaning industrial and consumer wastes.

To increase the efficiency and practical production of results of the joint work in creating instruments and equipment for nuclear science in 1972 in Warsaw the international economic association for nuclear instrument building, "Interatominstrument", was created. The purpose of this association is to more fully satisfy the needs of the CEMA nations for nuclear instruments and devices, which are of a high enough quality to equal the best in the world. The Interatominstrument Association is now comprised of 15 production and foreign trade organizations in Bulgaria, Hungary, East Germany, Poland, the USSR and Czechoslovakia.

In view of the large product list and the small series production level in nuclear instrument building, the chief task of Interatominstrument is to organize the specialization and cooperation. In 1976 a contract was signed that dealt with multilateral division of labor, in accordance with which the number of specialized manufactured articles is more than 40 percent of the total amount of goods turnover. An important stage in the economic work of the association was to create in 1975 - 1976 three service branches in Bulgaria, Poland and the USSR for the maintenance of nuclear instruments they had manufactured themselves and had imported from other nations. These branches are now operating on a full cost accounting basis /khozraschet/.

In the field of radiation safety work has been done to create and review the basic standard-methodoligical documentation, including that which is used at the designing, construction and operating stages of an AES, and for improving the systems and methods of radiation control of the environment and individual dosimetry. Research on the effect of AES exhausts on the radiation situation in ecological systems is done on a systematic basis. This research is concentrated on the radiation situation of the Dunay River Basin and the Baltic and Black seas according to an agreed-upon methodology. The results of this research attest to the high degree of safety of the AESs and the significant reduction in the pollution of the environment brought about by switching from organic fuel to nuclear fuel.

Key tasks of the cooperation in the near future were spelled out in the DTsPS for the period up to 1990. Their solution would be hastened by the signing of an agreement to cooperate in the development of atomic thermal electric power central systems, the assimilation of large capacity fast-neutron reactors and their adoption into the nuclear power complex of the CEMA nations.

An important role in the further industrial development of the atomic power industry, which is connected with increasing the size of reactor units and substantially raising their technical-economic indicators, could be played by the organizing of a comprehensive development and coordination of various systems of control and management.

In view of the experience that has been accumulated, the basic task of the current five-year plan is to consider the creation of a unified equipment system, based upon a unified element base. To do this it is necessary to concentrate efforts upon the priority directions of the scientific-technical cooperation plan for the years 1981 through 1985.

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ELECTRIC POWER

CEMA COOPERATION IN ELECTRIC POWER FIELD

Moscow EKONOMICHESKOYE SOTRUDNICHESTVO STRAN-CHLENOV SEV in Russian
No 3, 1981 pp 91-94

/Article by Boris Shcherbinin, department chief of the CEMA secretariat: "25 Years of Multilateral Cooperation of the CEMA Nations in the Electric Power Field"/

I

/Text/ Providing the intensively growing needs of the national economy for electric and thermal power is one of the main directions of the economic and scientific-technical cooperation of the CEMA nations.

An important stage in the work of the CEMA organization was the creation in 1956 of the Standing Commission on questions regarding the exchange of electric power between the member nations and the comprehensive use of the hydroresources of the Dunay River. Subsequently this commision was converted into the Standing Commission of CEMA on cooperation in the field of electric power.

During the initial period the commission organized cooperation on matters having to do with exchanging electric power between individual countries, including those whose borders touch, and developing intersystem electric connections. The commission laid the groundwork for the parallel operation of the power systems of the European CEMA nations. Cooperation was also manifest in the field of the rational use of low-calory solid fuels for generating electric power and producing thermal energy, and for reducing the cost and shortening the time needed to build TESs, GESs and electric power networks.

An important trend in the work of the commission was coordinating the five-year plans for the development of the electric power industries of the CEMA nations, and the scientific-technical research in this field.

In view of the urgency of the problem of more fully using hydroresources of the Dunay River, the commission drew up a plan for their comprehensive use, in which the CEMA nations were to jointly construct several large hydroelectric power projects.

With the help of the USSR, Romania and Yugoslavia built a hydroelectric and shipping system from Dzherdap to Zheleznyye Vorota-1 and a hydroelectric power station with a rated capacity of 2,100 MW. Hungary and Czechoslovakia are cooperating in the construction of the Gabchikovo-Nad'marosh GES, with a total rated capacity of 1,640 MW. Bulgaria and Romania are jointly designing the Turnu-Megureli - Nikopol hydroelectric power station with a total rated capacity of 800 MW.

Practice demonstrates that the most efficient way to electrify the national economies of the CEMA nations is to concentrate the production in large thermal, hydraulic and atomic power stations and to develop high-voltage electric power networks. Toward this end the power systems are being combined, which makes it possible to more efficiently use the various forms of resources, including low-calorie solid fuels, and to rationally combine the operation of thermal, atomic and hydroelectric power stations, and to effect savings from combining the schedule of electric power load and capacity reserves.

Based on considerations of the CEMA nations, the commission has justified the urgency of constructing intersystem electric power transmission lines and has made estimates of the anticipated efficiency of the parallel operation of the power systems. Proposals prepared by the commission, which were reviewed at the 11th Session of CEMA, laid the groundwork for combining the power systems of the European CEMA nations and the Western Ukrainian power system of the USSR. For organizing the parallel operation of these systems and also to coordinate the planned-mode and operating work of the state dispatch administrations, representatives from Bulgaria, Hungary, East Germany, Poland, Romania, the USSR and Czechoslovakia in 1962 signed an agreement to create the Central Dispatch Administration of the Unified Power Systems (TsDU OES) with the location of residence in Prague.

During the initial period the power systems of Hungary, East Germany, Poland, Czechoslovakia and the L'vov electric power system of the USSR worked on a parallel basis. Their total power load in January 1963 was 18,240 MW. Three two-link and two single-link high-voltage power transmission lines (LEP) at 220 KV and four two-link 110 KV LEPs were used for this purpose. The total carrying capacity was 2,200 MW.

In 1963 Romania's power system was joined into the parallel operation along a 400 KV power transmission line (temporarily at a voltage of 220 KV). In 1965 the Mukachevo (USSR) substation and Europe's first 400 KV intergovernmental electric power transmission lines were put into operation. The Mukachevo substation was constructed on a multilateral basis. The 400 KV LEPs operated between Ludush (Romania) and Mukachevo (USSR) and Lemeshany (Czechoslovakia). In 1967 following the inclusion of the Bulgarian power system in the parallel operation the formation of the unified power systems of the CEMA nations was completed for the TsDU.

As the result of the subsequent intensive development the total rated capacity of the OES by the end of 1980 was 137,000 MW (including for the USSR the OES of the South). The carrying capacity of the intersystem LEPs at a voltage of 220, 400 and 750 KW increased to 15,000 MW. The reciprocal exchange of electric power between the TsDU participants increased from 3.4 billion kilowatt-hours in 1963 to 31. 6 million kilowatt-hours in 1980.

An important undertaking was the use of joint efforts to construct and put into operation in 1979 the first international intersystem electric power transmisssion line with a voltage of 750 KV between Vinnitsa (USSR) and Al'bertirsha (Romania). As a result the parallel operation of the USSR's Unified Power System with the power systems of the East European CEMA nations was accomplished, which made it possible to significantly increase the planned export of electric power from the USSR to the involved CEMA nations.

In order to more fully use the advantages of the parallel operation of the two large power unifications an agreement was signed which ensured deliveries of electric power based upon the realization of the intersystem savings from combining the load schedule and the capacity reserves.

On the basis of a multilateral emergency mutual assistance there was an increase in the reliability of the power systems' operation. The necessary prerequisites were created for the adoption in the power systems of the nations of highly-economical power equipment of a significant per-unit capacity; the structure of generating capacities was also improved.

II

The production of electric and thermal energy according to growth rates occupies a leading place within the industrial branches of the CEMA nations.

On the whole for all nations the production of electric power in 1980 reached 1,726 billion kilowatt-hours, exceeding the 1950 level 12.7-fold.

On a world-wide basis the production of electric power for these nations was 21.3 percent in 1980 as compared with 13.6 percent in 1950.

The output of electric power in individual CEMA nations is characterized by the data in the table.

In the majority of the CEMA nations thermal electric power stations are most common. In seeking to make rational use of natural resources, they make intensive use of brown coal, lignites, the wastes of enriching coal, and shale.

In billions of kilowatt-hours

Country	1950	1960	1970	1980	1980 compared with 1950 (magnitide of increase)
Bulgaria	.8	4.7	19.5	34.8	43.5
Hungary	3.	7.6	14.5	23.9	8.0
Vietnam	--	--	--	4.0*	--
East Germany	19.5	40.3	67.7	98.8	5.1
Cuba	--	--	4.9	9.9	--
Mongolia	.02	.1	.5	1.4	70.0
Poland	9.4	29.3	64.5	121.9	13.0
Romania	2.1	7.7	35.1	67.5	32.1
USSR	91.2	292.0	741.0	1295.0	14.2
Czechoslovakia	9.3	24.5	45.2	72.7	7.8

* Preliminary data

In connection with this and realizing the program for the rapid development of atomic energy and the further use of hydroelectric resources in the near future it is planned to build thermal electric power stations which use a solid fuel. This makes it necessary to solve several complex problems, the coordination in the development of which is one of the important trends in the work of CEMA Standing Commission on cooperation in the power industry field.

A large number of projects within the framework of cooperation have been accomplished, in particular, on the problem of the intensification of the processes of drying and grinding fuel. These efforts have made it possible to review the diversity of the systems being used to pulverize and to make the appropriate generalizations. Various factors have been studied which have an effect upon the nature of combustion and burning of low-calorie fuels. The aerodynamic processes in furnace chambers have been studied. A significant amount of attention has been devoted to questions having to do with corrosion and contamination of heating surfaces, scorification, and ash erosion.

The intensive use in the power industry of low-calorie fuels has led to several problems connected with protecting the environment. For a comprehensive approach to solving these problems, the CEMA nations are developing and undertaking a large number of measures to use natural resources wisely and to ensure preservation of natural-climatic conditions and the balance of natural ecological systems.

The extensive exchange of scientific-technical and industrial experience, which is being accomplished within the framework of the commission, and the joint development of urgent problems are creating the prerequisites for the further purposeful interaction in this direction.

As the result of cooperation on a bilateral and multilateral basis between the CEMA nations large thermal electric power stations have been built or are now in the process of being built, which operate on a low-calorie solid fuel.

In Bulgaria several of these stations, including the energy complex that uses lignite from the Maritsa-East basin, were built with the technical assistance of the Soviet Union, which also supplied special power equipment for the use of lignite with a combustion heat of 1,300 Kcal/kg.

At the Maritsa-East III TETs Bulgarian and Soviet specialists have developed a progressive system for burning lignite, which makes it unnecessary to first dry the fuel. As a result there has been a significant economic savings.

In Hungary one of the largest thermal electric power stations was built near the D'yend'yesh coal field; this power station uses lignite with a combustion heat of 1,400 to 1,600 Kcal/kg.

In East Germany the Boksberg TES with a rated capacity of 3,500 MW was built, which uses brown coal at a combustion heat of 1,900 Kcal/kg. At the Khagenverder-III TES there are two power units with a per-unit rated capacity of 500 MW. This power station uses brown coal and the combustion heat is 1,500 to 2,200 Kcal/kg. The Iyenshval'de TES with a planned rated capacity of 3,000 MW is now under construction. This power station will use brown coal at a combustion heat of 1,900 Kcal/kg.

The Soviet Union is providing turbines and generators with a per-unit rated capacity of 500 MW for the East German thermal electric power stations. Polish organizations participated in the construction and Hungarian and Czechoslovakia participated in the installation of some of the equipment.

In Poland a large portion of the new generating capacities was put into operation at electric power stations near brown coal deposits. This includes the Turoshov and Konin-Turek TESs, at which fuel with a combustion heat of 1,600 to 2,200 Kcal/kg is burned. The Soviet Union provided ten of the first 200 MW turbine units for the Turov and Pontnuv TESs. A large thermal electric power station with a rated capacity of 4,320 MW is being built at the Belkhatuv coal deposit. This station consists of 12 units with a 360 MW capacity each. Brown coal will be burnt with a combustion heat of 1,900 Kcal/kg.

In Romania at the Krayova, Rovinar' and Turchen' TESs, which have power units with a per-unit capacity of 315 and 330 MW, lignite with a combustion heat on the order of 1,750 Kcal/kg is burned.

In the USSR the Pribaltiyskaya and Estonskaya TESs are functioning successfully, with a rated capacity of 1,450 and 1,600 MW respectively. These TESs can burn shale with a combustion heat on the order of 1,800 to 2,200 Kcal/kg. At several large electric power stations extensive use is being made of brown coal with a combustion heat of 2,500 to 3,500 Kcal/kg.

Ekibastuz and Kansk-Achinsk brown coal deposits served as the basis for undertaking the construction of several large thermal electric po- power stations with power units with a per-unit rated capacity of 500 to 800 MW.

In Czechoslovakia they are continuing to work on the North Cheshskiy and West Cheshskiy brown coal deposits with a combustion heat on the order of 2,300 Kcal/kg. At the Mel'nik-III electric power station they have put into operation a power unit with a per-unit rated capacity of 500 MW, using brown coal with a combustion heat of 2,260 to 2,860 Kcal/kg.

III

The comprehensive program and the DTsPS call for cooperation of the CEMA nations in drawing up and adopting new methods to efficiently and economically use in various sectors of the national economy fuel, energy and secondary power resources and to make greater use of local sources of fuel and hydroelectric power.

The solution of these tasks is to a large extent promoted by the interaction of the CEMA nations within the framework of the commission, which makes it possible to use each other's experience in designing, building and operating TESs using their own low-calorie solid fuels.

An important stage in the cooperation in the power industry is the realization of the General plan for the future development of the Unified Electric Power Systems of the CEMA nations, including the appropriate cooperation with Yugoslavia's electric power system.

The goal of the General Plan, which was drawn up by the commission, is to find ways to meet the growing requirements of the CEMA nations and Yugoslavia for electricity and to more fully use the economic advantages of the joint work of the power systems.

The General Plan provides a technical-economic justification for the future development of unified electric power systems and defines the optimal level of voltage for the intersystem power transmissions. It also reviews the prospects for the growth of the development of atomic power. Time periods for the development of the unified electric power systems to 1980, 1985, and 1990 have been established. And possible ways of covering the CEMA nations' needs for electric power are projected.

In order to realize the General Plan Bulgaria, Hungary, East Germany, Mongolia, Poland, Romania, the USSR and Czechoslovakia have signed a general agreement on cooperation in the future development of the unified electric power systems of the CEMA nations until the year 1990.

While drawing up the General Plan the CEMA nations made proposals on using joint efforts to build several power projects, which are of importance to the development of the unified electric power systems. This includes large atomic and water storage electric power stations.

Estimates indicate that the anticipated savings in established rated capacity of the electric power stations in the CEMA nations' power systems will be on the order of 4,600 MW. This is the equivalent of reducing capital investments in generating capacities for the 1990 level by nearly 400 million transferable rubles. For the CEMA nations this represents a direct economic savings.

In order to more rationally use fuel and to ensure the necessary ecological conditions in cities and industrial centers the General Plan calls for a growth in centralized heating systems from TETs's. It is planned to increase the established rated capacity of heating units by 1990 by 1.8 times as compared with 1975 with a simultaneous increase in the per-unit rated capacity of central heating turbines. Provision is also made for the development of central heating using atomic energy.

Raising the technical quality of CEMA nations' power industry, the increasing exchange flows of capacity and the desire of the CEMA nations to make use of the economical advantages of the parallel operation of the power systems have led to the need of creating intersystem power transmissions at a voltage of 750 KV. The first of these was the Vinnitsa (USSR) to Al'bertirsha (Hungary) LEP-750.

There is also a plan to realize other measures, which evolve from the General Plan and the DTsPS. An agreement has been signed on cooperation between Hungary, East Germany, Poland, the USSR and Czechoslovakia in the construction of operation of a 750 KV electric power transmission line from the Khmel'nitskaya AES (USSR) and Zheshuv (Poland) and the Zheshuv substation. The details are still being coordinated in connection with the forthcoming construction of a 750 KV electric power transmission line between the USSR, Romania and Bulgaria.

An important place in the multilateral ties between the CEMA nations in the power field is occupied by the problems having to do with the rapid construction of atomic electric power stations. This is caused primarily by the lack or limited supplies of petroleum, natural gas and in some nations coal, and the desire to use available resources as a technological raw material.

The development of atomic power, and in particular the development and manufacture of equipment for atomic electric power stations, questions having to do with their designing, construction and operation, reliability and safety and also the disposal of radioactive wastes can most successfully be resolved through multilateral cooperation.

During the recent past the atomic power industry in the CEMA nations has largely been created on the basis of series produced power units with water-cooled RBMK reactors with a rated capacity of 1,000 and 1,500 MW.

Today atomic electric power stations are in operation in Bulgaria, East Germany, the USSR and in Czechoslovakia. Their total rated capacity has reached 17,800 MW. Additional capacities are being put

into operation at existing atomic electric power stations and new ones are being built. The first AES in Hungary is nearing completion. Preparatory work is underway for the construction of atomic electric power stations in several other CEMA nations and in Cuba. The completion of these atomic electric power stations, which are being built with the help of the Soviet Union through the year 1990, will be an important step in realizing the DTsPS in the energy, fuel and raw materials field, and will make an important contribution to enabling these nations to solve their energy problem.

The completion of the Khmel'nitskaya AES in the USSR will be of great importance. This AES will have a rated capacity of 4,000 MW. The General Agreement on this project, which was signed by Hungary, Poland, the USSR and Czechoslovakia, calls for cooperation in its construction and Soviet deliveries of electric power to the CEMA nations, which worked on the project. In accordance with the DTsPS interested CEMA nations are to participate in the construction of one more AES within the Soviet Union - the Konstantinovskaya AES, with a rated capacity of 4,000 MW.

The Agreement on multilateral international specialization and cooperation in the production and joint deliveries of AES equipment during the period 1981 through 1990, which was signed by Bulgaria, Hungary, East Germany, Poland, Romania, the USSR, Czechoslovakia and Yugoslavia, at the 33rd meeting of Council Session, will promote the rapid development of atomic power in the CEMA nations.

To implement the Agreement the CEMA nations are allocating large sums of money for the modernization of existing and the construction of new power machine building enterprises.

An intergovernmental commission has been created to assist the nations in realizing the agreement and to maintain a systematic oversight of the progress in carrying it out. In its work the commission will use the resources of the international economic associations Interatomenergo and Interatominstrument.

In seeking to effect the development of the atomic power industry, the CEMA nations are combining efforts in the field of science and technology. They have signed an Agreement and Program of cooperation on the problem "assimilating power units with water-cooled reactors with a rated capacity of 1,000 MW (el.) and further improving such reactors."

Preparations are now underway to organize the multilateral cooperation of the interested CEMA nations in developing the ATETs and AST to meet the needs for heating systems and the production of industrial steam.

The rapid development of the electric power industry - one of the base sectors of the national economy - is a key condition for the successful raising of the economies of the CEMA nations. In this regard

the extensive multilateral cooperation over a 25 year period between the CEMA nations takes on increased importance within the framework of the Council of Economic Mutual Assistance.

Stable economic, scientific-technical and production ties between the CEMA nations will in the future lead to the solution of the crucial tasks in the field of electric power. These tasks have been advanced by the congresses of the communist and workers' parties.

8927
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UNDERGROUND COAL-MINING OFFICIALS, WORKERS DISCUSS PROBLEMS

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 15 Aug 81 p 4

[Article by N. Goncharov, the newspaper's Heavy Industry Section editor (Mezhdurechensk-Moscow): "The Energy of the Initiative"]

[Text] Coal-industry innovators at SOTSIALISTICHESKAYA INDUSTRIYA's roundtable.

Competition Is the Masses' Creativity (August 1981, Issue No 8, 104).

As we have already reported, the USSR Ministry of Coal Industry, the industry's trade-union central committee and the Kemerovskaya Oblast CPSU Committee conducted in Mezhdurechensk an All-Union School of Advanced Underground-Mine Experience. Gathered here were the leaders of the best miners' brigades, the chiefs of advanced sections, and the directors of the industry's best underground mines. They visited Yuzhkuzbassugol' Association enterprises, exchanged experience about highly productive work in the "thousandeer" brigades, and adopted recommendations on introduction of the scientific organization of work at all mechanized mine faces, further development of the competition for high output by miners, and the most rapid replication of effective innovators' initiatives.

The editorial board invited the school participants to a roundtable to discuss questions of the "thousandeers" movement and the organization of competition for increasing the miners' labor productivity, which are coming to a head. The bases for this discussion were weighty....

The competition of the equipment operators who are in the thousandeers movement, which the CPSU Central Committee approved, has undoubtedly become a powerful means for increasing the mining of fuel. During the labor contest of many years, a number of valuable initiatives that have been the property not only of the miners but also of the workers of other industries have come up. But the potential of the thousandeers movement still is not being used completely by far. Deficiencies in their work have become more noticeable, in light of the new tasks that the 26th CPSU Congress set for underground miners. Many longwalls equipped with mining complexes that have converted to the thousandeer regime are not coping with these workloads. The arrears in coal for lagging underground mines since the start of the year is more than 5 million tons. The labor productivity of the workers engaged in mining fuel has been reduced. Tens of mines are not meeting the plan for this most important indicator.

This provokes anxiety both within the industry's staff and locally. A search is going on for more effective ways for increasing the activeness of the competition. Suggestions that were interesting, or even controversial, were expresssed. The machinery operators themselves took an active part in this discussion. Let us recall, if we may, the statements of brigade leaders A. Akimov, M. Chikh and N. Shevtsov under the recurring heading, "The Workers' Forum," in our newspaper. Echoes of this unfinished businesslike discussion were heard clearly also in the conversation around SOTSIALISTICHESKAYA INDUSTRIYA's roundtable in Mezhdurechensk. Taking part in it were Deputy USSR Minister of Coal Industry G. Nuzhdikhin, secretary of the central committee of the industry's trade union N. Budnikov, deputy chief of the Coal-Industry Section of the Kemerovskaya Oblast CPSU Committee Yu. D'yakov, secretary of the party's Mezhdurechensk City Committee S. Proskurin, the General Directors of the Yuzhkuzbassugol' and Gidrougol' Associations V. Yalevskiy and A. Gontov, Chairman of the Novokuznetsk regional trade-union committee F. Skachkov, mine directors V. Abramov, V. Yerpylev, A. Achinovich and L. Torn, and others.

In the Mirror of Statistics

"Imagine for a minute the improbable," G. Nuzhdikhin unexpectedly proposed to his collocutors, "that we have no thousandeers in the industry. In order to send to the top as much coal as they are now producing, we would have to have an additional 300 breakage faces and 25,000 workers and to pay them annually in wages alone about 100 million rubles. This is what the thousandeers movement means!

"And it is not just a matter of tons and resources saved above the plan," continued the deputy minister. "The thousandeers' competition shapes the modern skilled worker, a man of high sophistication and conscious discipline, who develops a creative sharpness and initiative and a feeling of collectivism. And this is how we recognize and assess the brigades of Mikhail Pavlovich Chikh, Aleksandr Yakovlevich Kolesnikov, Petr Innokent'yevich Frolov, Anatoliy Denisovich Polishchuk and Ivan Ignat'yevich Sorochinskiy, section chiefs Ivan Ivanovich Strel'chenko, Petr Aleksandrovich Yermakov and Al'bert Gergardovich Salamatin, and others. With their innovations and skill in working with people, they are constantly enlivening the thousandeers movement and enabling the industry to solve increasingly complicated problems. Do not forget that although we are striving in every way to speed up the development of strip coal mining, more than 60 percent of the coal is still being mined underground and with ever-increasing difficulty. And the thousandeers give almost half of these difficult tons. It should be added, moreover, that their labor productivity is 3-fold greater than the average for the industry...."

Unidentified voice: "But the thousandeers have become appreciably fewer...."

G. Nuzhdikhin: "That's true. Speaking frankly, we have taken a step backward in some associations. But this is relative to the number of brigades. Yet the amount of the thousandeers' work has increased considerably. Judge for yourself: right now they are mining annually 23.3 million tons of coal more than 5 years ago. But the main thing is that two promising branches of the machinery operators' competition are burgeoning at the heart of the thousandeers movement--the competition of the '500,000-tonners' and the 'million tonners.' We have 89 of the first, 9 of the second. But we count on having 17 million-tonner longwalls this year--"

Unidentified voice: "Make it more precise--longwalls or brigades!"

G. Nuzhdikhin: "Brigades, brigades. Regarding the million-tonner longwalls--this matter is a special--"

"That means that some million-tonner brigades are working at more than one longwall? And how do you keep track of the amount mined?"

"Perhaps Mikhail Pavlovich Chikh will introduce clarity?

"I will do it," the brigade leader called out willingly. "I have been hearing these exchanges for a long time. Devyatko in January, at a meeting of the ministry's board, countered: he said, take the whole mine and the brigade will produce a million. Without a reserve longwall it is in no way possible for us. The tunnelers do not have time to prepare new mine faces, yet we want to operate rhythmically. We have a reserve longwall for all occasions, and it has been picked at for 3 whole years. And we take about 20,000-25,000 tons per month from it, but more than 1 million tons per year from the main longwall. So, however you look at it, we have a million-tonner brigade...."

Unidentified voice: "Nevertheless, the reserve longwall increases the amount of mining you do considerably. Without it you certainly would have to make way in the competition for some of the new million-tonners."

M. Chikh, brigade leader of the Mayskaya Underground Mine: "It is still necessary to count thoroughly. But on the other hand, whatever you do with them--these are tons: even though they come from a reserve longwall, our brigade mined them. Let the tunnelers be included in the thousandeers movement and they will give us a work front. And it will be no job for us."

G. Nuzhdikhin: "You have noticed one of the largest gaps in the thousandeers movement. For a number of reasons, our tunneler does not keep pace with our breakage-face worker. We in the ministry are very much occupied with tunneling: we have begun to plan it, to motivate it better, and to be more demanding of it. But still not everything is going as contemplated. There are more failures here than real successes. Severokuzbassugol', Vorkutaugol', Pervomayskugol', Selidovugol' and other associations are not meeting the plan for preparatory work this year. Yes, and for the ministry as a whole, each year we fall short many tens of kilometers of tunneling. And these are all longwalls not prepared on time, at which new thousandeers would be able to work. But, as is said, errors and failures are also experience, which we are studying."

G. Smirnov, section chief of the Yubileynaya Underground Mine: "It would be better for us to study positive experience. There are so many useful initiatives that are directly connected with the thousandeers movement which will enrich the experience gained in the industry! But the whole trouble is that many remarkable initiatives wither at the root. Thus, our advanced brigades at our Underground Mine imeni 7 Noyabr' in the Kuzbass at one time issued a call to work without breakdowns. I think that it is not necessary to explain here what this means to our industry. The lads began here a better business! Hands were clapped for them in the ministry, the industry's trade-union central committee and the association, but a good start for the organizational work was not supported. And it indeed would be possible to provide engineering support everywhere, and, perhaps, to think about good moral and material incentives for breakdownfree operation. Certainly it would find followers in the industry. Unfortunately, the proper prestige was not

accorded the businesslike initiative, so it became somewhat ordinary, and it became 'dissolved' in everyday matters. Thus still another working initiative became barren...."

V. Yerpylev, director of the Nagornaya Underground Mine, related that certain associations unwittingly clipped the wings of another initiative that had been approved by a joint decree of the ministry's board and the Central Committee of the Trade Union of Coal Industry Workers. But first a few words about the initiative itself. As is known, one of the initiators of the thousandeers movement, I. Strel'chenko, called upon miners, through the newspaper SOTSIALISTICHESKAYA INDUSTRIYA, to use equipment effectively and thriftily. Scarcely anything was said about this initiative at any of the business meetings of specialists or at miners' rallies. And then, in the opinion of V. Yerpylev, the principle itself of competition for an active useful life for the basic mining equipment was violated, for the equipment was pooled. As soon as a longwall is worked out, special assembly administrations that have been established in the basin pick the equipment up, screen it and they can even send it to another city. The brigade undertook a commitment to lengthen the time between repairs of the longwall mining complex and to mine with it, for example, a million tons. But the longwalls have, let's say, 300,000-400,000 tons each. Reassembly, which the brigade is not engaged in, is a necessity. In order to avoid reducing the workload per mine face, the brigade goes at this time to an entirely different longwall-mining complex. "It is urged to take a workload," said V. Yerpylev, as though discussing it out loud, "and it loses equipment in whose maintenance the people have invested a part of themselves." The brigade drags behind its machine and does not keep its word on another indicator. "How is all this to be combined when you are tied up with such a high commitment?" asks Yerpylev. And all fall silent for a long time, thinking about the unexpected case from a miner's life.

Director of the Viru Underground Mine of the Estonslanets Association L. Torn, as if continuing V. Yerpylev's discussion, "went around" to the other side of the problem:

"A material incentive for those who operate equipment thriftily is unthinkable without material responsibility. And here, at times, some fairly curious things occur. We had a KrAZ which had served us efficiently for 14 years, until it became decrepit and the accounting office wrote it off. But our experts restored the worn vehicle literally from nothing. They transferred the vehicle to a new driver, who got behind the wheel and, being tipsy after payday, wrecked it all over again. We tried to penalize him for the material damage in the full amount for a good serviceable vehicle. But it turned out that they were even grateful to the slob: the accounting office had listed the vehicle as being broken down, and he had brought it into correspondence with the accounting data...."

Brigade leader of the Zvryanovskaya Underground Mine V. Bovt enthusiastically spoke out against the pooling of longwall miners. Completely outfitted equipment with spare parts must be sent to the brigades for their responsibility, and the brigade contract must be introduced, with a commitment, let's say, to mine a million tons with that very equipment, not allowing it to be substituted, and after setting an award for it. In this way each brigade will be motivated to preserve the machine and to achieve high results with it. G. Nuzhdikhin added that there would be no harm in recalling the initiative of certain "go-getting" operators who would try to obtain new equipment for each commitment, and local managers will at times help them to do so.

Director of the Trudovskaya Underground Mine A. Achinovich, listening to his colleagues, noted something impatiently on his pad. "When everyone is responsible for the collective's equipment, then," he said, having joined the conversation, "usually no one answers for it. At the Trudovskaya mine, ever since Ivan Strel'chenko made his celebrated repair rhythm an inviolable rule, he assigned each worker to a specific machine or mechanism, according to his interests, knowledge and propensities, and personal responsibility for the technical condition of the equipment was introduced by order throughout the mine, not only for repairmen but also for the miners. This document spelled out with a certain symbol what specific benefit awaited each miner for an increase in the time between repairs for the machine. Measures for influencing the negligent also were set."

Thus, in one industry, excellent experience and "unsolvable problems" are taken peacefully in stride in the coal basins that have been competing with each other for years....

Twice Thousandeers

Five years ago the Donbass's advanced brigades were called upon to raise the miners' skills in every possible way, to produce more coal with fewer people, and to mine at each mine face equipped with longwall mining machines not only at least 1,000 tons of coal per day but also to achieve a labor productivity per breakage-face worker of at least 1,000 tons per month. This was a new work in the development of the industry's equipment-operators' movement. The initiative of the "twice thousandeers" was assessed highly by the industry's staff and in all the coal basins. Its special attractiveness consisted in the fact that for the first time it was decided to compete for these indispensable 2,000 tons precisely in the Donbass, where such an output is achieved with extraordinary difficulty. Therefore, the Donets miners' followers in various coal basins quickly appeared. With the active support of the ministry, a new area of competition began to be formulated for miners at longwalls equipped with longwall miners, which brought tens of brigades out into their orbit, as if the thousandeers movement had been renovated. Right now this advanced miners' detachment numbers 73 collectives. There are especially many "twice thousandeers" in the Kuzbass and Vorkuta.

This Donets initiative has become a truly invaluable gift for the industry, which constantly feels the inadequacies of the workers' doings. The experience of the "twice thousandeers" had been studied right away at Mezhdurechensk. Here they came to an understanding jointly about everything: the output aimed at and the basins in which the competition must be guided, how to encourage the contest participants, how much can be expected from the followers, and just which innovations borrowed from the Kuzbass will the school's participants quickly introduce at their own mines.

But scarcely had the talk turned to a simple and concrete matter--who and how many miners in the brigades can be released in the near future, in order to be included in the competition for more coal with fewer personnel--when our collocutors one after another began to complain about faulty equipment and the shortage of small-scale mechanized equipment.

Brigade leader of the Krasnolimanskaya Underground Mine V. Ignat'yev declared, "My brigade could be reduced by 10-15 people, but it would be necessary for this purpose to mechanize the auxiliary work. I have been able to visit V. Devyatko's

brigade at the Raspadskaya Mine. I saw them erecting support sections there and manually dragging them from one place to another...."

"It cannot be denied, there is still no little manual labor around the longwall mines," said Donets brigade leader Chikh, backing him up. "Where it would be possible for one man to work, we keep two. Take, for instance, our Mayskaya mine. The seams there are, as we say, inconsistent in thickness, and now and then we have to change the support height at them. And all this is difficult manual labor. And how much confusion there is with the turbocouplings. At Khar'kov we operate them, for example, for a month, but at Tula they do not hold up for half a day. The refinement of the Druzhkovskiy plant's cutter-loaders at the mine takes away many people. Big lumps of coal do not pass under the cutter-loader's frame, and we ourselves widen the cross-section and thereby we weaken the structure. I would like to see scientists and designers at our longwall more often so we can improve the equipment together."

Section chief of the Vorgashorskaya Underground Mine P. Yermakov considers that the Kran Association machinebuilders mistakenly do not produce longwall mining machines in accordance with the optimum longwall length. In order to get out of the situation, new supports have to be hooked on by worn sections, condemning the brigade to an earlier breakdown. And there are no few losses of coal, which is much more expensive than the missing sections.

B. Kulikov, brigade leader of the Raspadskaya Underground Mine: "It is still worse when such a high-capacity longwall miner as the KM-130 is stopped because of a cheap, weak part. How much this costs in nerves and in lost coal! We spoke to representatives of Kargormash and Giprouglemash, which had to reinforce the supports with a groove: the pin that holds it often slips out and the longwall mining machine goes into a breakdown. We have been promised that steps would be taken. But a year has passed now, and they have delivered miner No 27 (we have No 14) to the Underground Mine imeni Lenin and there have been no changes of any kind!"

Unidentified voice: "It is unprofitable for the plant to change the technology."

B. Kulikov: "And no new technology of any kind is needed there: you weld a piece of metal to it and bore a hole in it. We were simply tired of breakdowns caused by the trifles that exist. We were idle for 2-4 hours. This year three of our brigades with such longwall miners lost 120,000 tons of coal for this reason alone."

Unidentified voice: "And how, in general, are things going with breakdowns and idle time in the industry?"

G. Nuzhdikhin: "Unfortunately, there is still much. Because of the high breakdown rate for mining machinery and equipment, let's say in the Severokuzbassugol' Association, idle time of breakage fronts is almost 45 percent of shift time, in Voroshilovgradugol' it is more than 40 percent. These data are time-study observations...."

Director of the Raspadskaya Underground Mine V. Abramov states that many Kuzbass mine faces do not have the longwall miners that are needed for the mining conditions. It is precisely such longwalls that have high breakdown rates. Deputy

chief of the Coal-Industry Section of the Kemerovskaya Oblast CPSU Committee Yu. D'yakov clarifies this: "Out of 198 longwall miners that are operating at the oblast's mines, more than half do not meet the mine-geology requirements. There are great coal losses because of this. The workload at the mine face is reduced. Both improved equipment and new technology are needed."

General director of the Yuzhkuzbassugol' Association V. Yalevskiy: "Such equipment could be created more quickly if the scientific and design-development forces were not so dispersed. For example, the institutes PNIUI [Perm' Scientific-Research Institute for Coal] and Giprouglemash [State Design-Development and Experimental Institute for Coal Machinebuilding] are working simultaneously on the very same type of mine supports. Our specialists have become acquainted with both models and they have seen that both the one and the other have defects. We have ourselves made a hybrid of the two models, and we invited the originators to the mine. They sat at a roundtable but the representatives of the two institutes never could agree on a common language. And up till now we still do not have one refined model. Perhaps experienced worker-innovators and specialists from the field should be introduced into membership in the institute's scientific councils, to express the opinions of the operators."

Chief engineer of the Raspadskaya Underground Mine A. Lyutenko noted completely correctly that innovations created by skilled personnel of coal enterprises spend a long time beating their way to the plants, and he proposed that all industries conduct large-scale certification of workplaces, as is being done in the Ukraine, make a detailed study of each operation at the mechanized longwall, establish at large mines support centers for fabricating small-scale mechanization equipment, and establish at such mines at Raspadskaya, which test and give the go-ahead to many models of equipment, an experimental department with its own design-development office, in order to speed up the refinement of equipment and the endless coordination with the manufacturing plants.

Someone did not agree with this recommendation. A dispute arose, from which it never became clear how to speed up the progress of small-scale mechanization equipment, from the model to series production.

General Director of the Gidrougol' Association A. Gontov, as though concluding the discussion about miners' equipment, said that even the best perfected mining equipment will not give the expected yield if we will still further operate in obsolete underground mines with short fields, and that modern mining equipment has come into a contradiction with the conditions of its operation. Without earnest modernization and rebuilding, without the preparation of new underground mine fields and new modern coal enterprises, the thousandeers movement will not rise to a new level.

"Just one example. We have in our association million-ton workloads, which Smirnov, Musokhranov and Mingulov previously reached more than once. What do they have right now, have their skills diminished? There is simply nowhere for them to go to work with modern machines. The sooner we bring underground mines into correspondence with the new equipment, the sooner the million-tonners movement will become large in scale...."

Lift up the 'Middling Person'

"Equipment is equipment," said V. Yerpylev, beginning a new twist of the conversation, "but it is necessary also to take organization of the competition for the

industry's equipment operators seriously. We have here, in my opinion, much that is obsolete, subjective and, at times, formalistic, which does not answer to the very conditions of mining work. We transfer the principle itself of the labor contest from the plant or factory, where the machine tenders enjoy approximately equal conditions, to the longwall, without taking into account the peculiarities of the mining business. But indeed, is it possible to construct under this principle a competition for miners who are equipped with different types of equipment and who are operating at different seams, and at longwalls which are incredibly diverse in mining complexity? In any business, fairness is necessary, particularly in the organization of competition."

Yerpylev invited the conferees to take a look at a picture that is imaginary but, nonetheless, in his opinion, a picture that resembles mining competition. In Mezhdurechensk three brigade leaders are seated on different means of locomotion--one on a Volga motor vehicle, another on a bicycle, the third on a horse--while at Novokuznetsk they are waiting with impatience to see which of them will come in first. The car driver does not race vigorously, because the cyclist does not compete with him; the cyclist does not press down on the pedals rapidly for it is of no use for him to pursue the car driver. And what is there to say about the horseman!

"And this is also how we are competing at the mines, increasing the interlayerings of 'middling persons' who have lost interest in work that takes initiative. The advanced workers are conspicuous everywhere. But the 'middling persons' are unintentionally acclimated to a quiet life. Even the laggards are in the public eye more, for we have already learned how to establish a social opinion around them. The average brigades somehow have been forgotten. We must in all earnestness lift the 'middling persons' up to become thousandeers and million-tonners, for among them, I am convinced, we will find persons like Strel'chenko, Chikh and Devyatko more quickly. And there is but one road to them--the most rapid replication of the best experience and a lighting up of the fervor of competitiveness under conditions of quality in competition. But the assistance to the 'middling persons' on the part of the million-tonners and 500,000-tonners is necessary here...."

G. Nuzhdikhin: "Tutorship by the advanced workers for the laggards and the help given the latter at the mine face have been fairly well organized on our part. Last year, for example, almost 800 brigades and sections were instructors' collectives, and, for the industry as a whole, 75,000 workers and specialists are participating in this work. There are, it is true, associations, let's say, Krasnodonugol' and Severokuzbassugol', where tutorship is not given proper attention. But in general we have exerted an appreciable influence on work improvement.

Unidentified voice: "How many brigades in the industry are equipped with mechanized longwall-mining complexes?"

G. Nuzhdikhin: "One thousand three hundred."

"And longwalls that have converted to the thousandeer regime--there are 434 in all."

G. Nuzhdikhin: "We have no few candidates for thousandeers."

A. Salamatin, section chief of the Mikhaylovskaya Underground Mine: "Indisputably, something must be changed in the mechanism itself of experience exchange. Yesterday I was at the Nagornaya Underground Mine, and there was much that appealed to me

at once. But, you understand, you must seek in the work of an advanced collective, at first glance, the unremarkable features. It is necessary to spend a shift or two with this brigade, and then you will see that which does not strike the eye at once. In replicating experience, lengthy interaction is important. That which we are doing at present as a matter of personal initiative should be written into a ministry document. I propose that each advanced collective write in, along with the chief commitments that are approved by the board and the industry's trade-union central committee, which specific 'middling' brigade it will raise to its own heights and just how much coal it will produce. This, so that none of those being sponsored will lift their hands in failure the week prior to the end of the month, but will fight for the commitment each day, right up to 31 December, as the brigades with high workloads are doing. This also will be an active introduction of experience."

V. Devyatko, brigade leader of the Raspadskaya Underground Mine: "One must think also about better material incentives for brigades with million-ton workloads."

G. Nuzhdikhin, in agreeing with this, stated in conclusion that the ministry is working out new competition terms in which the suggestions introduced at SOTSIALITICHESKAYA INDUSTRIYA's roundtable will also be considered. He once more recalled the motto of the "twice thousandeers": "More coal and higher work quality with fewer people." And he cited this case. In Severokuzbasugol' Association, miner manpower at breakage faces has been reduced by 4.6 percent and on the surface it has increased 10.6 percent. You do not improve output per person this way.

And other questions were raised at the roundtable: about raising fuel quality, about improving the repair service when the job requires a high workload, and about how to drive against irretrievable coal losses....Section chief P. Yermakov and brigade leaders and Heroes of Socialist Labor A. Polishchuk and V. Devyatko spoke with concern about this. Perhaps something has been left unsaid, but ahead are new encounters, and one must hurry to one's mine face....

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OIL REFINING PROGRESS, PROSPECTS REVIEWED

Moscow EKONOMICHESKAYA GAZETA in Russian No 46, Nov 81 p 2

[Article: "The Oil Refining Industry--a Review"]

[Text] The oil-refining industry is an important element of the country's fuel and power complex. This industry's products provide for reliable and long-lived operation of machinery and mechanisms, set thermal electric-power turbines and the engines of surface, air, maritime and river transport into motion, and serve as a raw material for obtaining a wide range of products of organic synthesis. There is no branch of production that does not use some products of oil refining.

The industry developed dynamically during the 10th Five-Year Plan. The share of petroleum product with the State Emblem of Quality more than doubled, reaching 30.6 percent. Losses of crude oil and of petroleum product in the total volume of refining fell from 1.51 to 1.25 percent.

Consolidation and Combining

In accordance with 26th Party Congress decisions, quality factors in developing the production of petroleum product will be of still greater significance during the 11th Five-Year Plan than during the preceding period. The consolidation and combining of industrial processes are to be the directions that will determine technical progress.

During the 11th Five-Year Plan, enterprises will continue to be supplied with high-tonnage installations, such as primary refining installations with unit capacities of 6 million tons of crude per year each, hydrorefining installations with unit capacities of 2 million tons of diesel fuel per year each, and catalytic reforming installations for finishing 1 million tons of gasoline per year each, as well as high-capacity systems that combine these processes. Simultaneously there will be high-tonnage units for catalytic cracking and coking and combined installations for high-severity refining of mazut with a capacity of up to 5 million tons and for the production of lubricating oils with a productivity of 380,000 tons. It should be noted that almost a third of the new equipment for the primary refining of crude is intended to replace obsolete and worn installations and to raise the technical level of existing production.

The execution of these measures promises no little economic benefit. According to the specialists' computations, the policy to consolidate and combine

industrial processes will enable 200 million rubles of capital investment and more than 60,000 tons of metal to be saved and the hiring of an additional 2,000 servicing personnel to be avoided during the 11th Five-Year Plan. Moreover, a saving of about 1.9 million tons of standard fuel equivalent will be provided for.

The industry now has a specific program of actions for intensifying oil refining and increasing the production of electrode-grade coke during the 11th Five-Year Plan. The realization of what has been planned will require the coordinated efforts of builders and installers, machinebuilders and oil-refinery workers in the erection of high-capacity units for catalytic cracking and hydrocracking, high severity refining of mazut, and delayed coking, which permits additional amounts of white product to be obtained, along with electrode-grade coke. Putting these facilities into operation will save a large quantity of mazut from being burned in boiler-unit fireboxes and enable an additional increase in engine-fuel resources.

Erection of the first such high-tonnage installations for high-severity oil refining has been going on full blast in the Omsknefteorgsintez Association and at the Moscow and Pavlodar oil refineries. Along with this, the potential for intensifying oil refining at existing capacity by rebuilding and reequipping should be completely realized during this five-year plan.

Reserves for Savings

Improvement in saving material resources is of special importance to the industry. Expenditures on raw materials, reactants, catalysts, and fuel and power make up almost 70 percent of all prime costs for producing oil-refining and petrochemistry output.

The rebuilding of existing facilities and the construction of new ones for the gathering and utilization of gas will greatly reduce the amount of gas flared off. The network of pipelines that will transport petroleum product, to replace rail hauling, will be expanded. A goal for 1985 is to reduce losses of crude and petroleum product in overall refining by up to 1.1 percent.

Right now crude-oil and petroleum-product losses in the Kirishinefteorgsintez and Yaroslavnefteorgsintez Associations and at the Mozyr', Novopolotsk and Ryazan' refineries are 0.6-0.7 percent of refining volume. At the same time many many enterprises lose more than 1½ percent. In the Fergananefteorgsintez Association and at the Krasnovodsk Oil Refinery, losses reach 3 and even 4 percent. This is an irreconcilable situation. USSR Minneftekhimprom [Ministry of Petroleum Refining and Petrochemical Industry] must earmark the appropriate funds and resources during the 11th Five-Year Plan for work that will insure that losses at these enterprises are reduced to the level established by the standards. Much can and should be done in this respect by the working collectives themselves, using advanced experience.

Progressive power-generating and power-consuming equipment and industrial processes, installations and machinery that support a high technical level of production at minimal expense in power are to be introduced. The level of use of secondary fuel and power resources is being increased. The recuperation of heat within industrial units will find maximum application. All this should sharply reduce losses of fuel and petroleum product during production, transport, storage and use. Simultaneously,

the industry has been called upon to speed up the introduction of secondary oil-refining processes with a view to increasing white-product output.

During the 11th Five-Year Plan 150 heat-recovery boilers that are based upon new and rebuilt industrial installations should be put into operation. These will enable heat-energy utilization to be about doubled at the oil refineries themselves, bringing it up to 22 million gigacalories during 1985. The planned reconstruction of heat-exchange units at 12 existing installations that accomplish the primary refining of crude oil and the planned modernization of process furnaces will pave the way for saving almost 1 million tons of standard fuel equivalent during this five-year plan. Another half million tons can be saved by using refinery gas, which is still being flared off, as a fuel, and also by introducing 450 improved air-preheater installations.

For High Quality and Effectiveness

Important qualitative changes in the 11th Five-Year Plan touched upon the structure of engine-fuel production. The share of gasoline of high octane (A-76 and higher) in total automotive-gasoline production will grow from the present 64 percent to 87 percent in 1985 and 96 percent by the end of the decade. Diesel-fuel quality also is being improved. In 1985 all production of it will have a sulfur content of less than 0.5 percent, and more than half of it will have less than 0.2 percent sulfur. This will help to increase engine life and greatly improve the sanitary condition of the air.

It is planned to raise the quality of engine fuel considerably by using additives that improve operating properties. The introduction of such additives will also reduce fuel consumption.

During the 11th Five-Year Plan the production of low-grade lubricating materials will be sharply reduced and then it will cease. The share of oils with integrated highly effective additives for boosted engines will increase to 50.3 percent. Computations indicate that executing the measures for improving lubricating oil quality that are planned for 1981-1985 will reduce consumption of these oils and will enable at least 350 million rubles to be saved through the reduction in their consumption and through fuel savings. In this case, customers for petroleum product will receive no small benefit through the increased operating life of engines, machinery and mechanisms and reduction in costs for operating them.

According to estimates, in 1985 about one-third of oil-refining industry output will be produced with the State Emblem of Quality. Many enterprises have already greatly increased the production of output of the highest quality category during the 11th Five-Year Plan. However, during this five-year plan the industry is being called upon for an insignificant increase in the share of petroleum product that has the State Emblem of Quality, although the opportunities here are not insubstantial.

With a view to bringing production operations closer to the regions of mass consumption of petroleum product, it is planned during the 11th Five-Year Plan to construct three new enterprises--in Achinsk (Krasnoyarskiy Kray), Chimkent (Kazakh SSR) and Chardzhou (Turkmen SSR)--and also to put second lines into operation at the oil refineries at Pavlodar (Kazakh SSR), Mazheykyay (Lithuanian SSR) and

Lisichansk (Voroshilovgradskaya Oblast). It will not be possible to man this many new large facilities completely without increasing worker manning.

Therefore, during the 11th Five-Year Plan, growth in labor productivity for the industry as a whole will provide for only 85 percent of the increase in output. In so doing, it will be necessary to release 70,000 servicing personnel from existing enterprises for work at the new facilities. This task requires that party, trade-union organization and economic managers work actively to mobilize collectives in the search for additional reserves for raising labor productivity and for improving the management and organization of production. Wide dissemination of the method of Shchekino's chemical workers and of its so-called Bashkir variant, which was born in Bashneftekhimzavod Association, can play an important role here.

Labor productivity in the oil-refining industry in 1975 was 148 percent of 1970's, in 1980 the figure was 177 percent, and it is planned to be 200 percent in 1985.

The industry as a whole is completing its first year of the 11th Five-Year Plan successfully. By the 64th Anniversary of the Great October, socialist commitments to increase the output of products with the State Emblem of Quality, diesel fuel, high-octane automotive gasoline, furnace fuel oil, industrial-grade carbon, phenol and acetone had been carried out.

At the same time a lag in the production of aviation gasoline, lubricating oils, automotive engine oils, bitumen, coke and solid and liquid paraffins, as well as in capital construction, had been permitted. Azerbaijan SSR Minneftekhimprom [Ministry of Petroleum Refining and Petrochemical Industry] and the VPO [All-Union Industrial Association] Soyuznefteorgsintez are not coping with the task for the primary refining of crude and a number of other items.

Interruptions on the part of MPS [Ministry of Railways] in providing rolling stock for shipping product are exerting a negative effect on the industry's regularity of operation. However, USSR Minneftekhimprom and its VPO's should be concerned primarily about the precise and uniform output of petroleum product. Thus, in the breakdown by month of the fourth-quarter plan, the center of gravity proves to have been moved to December, while the tasks for October and November were unjustifiably understated. For example, the production association Groznefteorgsintez postponed until the last month almost 40 percent of the quarterly plan. Similar skewing in planning affects, in the final analysis, the normal activity of petroleum-product customers, and this must be corrected.

Right now the industry's laboring collectives are preparing to adopt counterplans for 1982 and the 11th Five-Year Plan. In so doing, it is very important to consider the necessity for improving quality indicators, and to use the advantages of new management methods more completely. Ideological and political-education work in enterprise collectives should be aimed at developing the masses' initiative and creativity.

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OIL RECOVERY BOOSTED BY FIREFLOODING, BETTER MAINTENANCE OF OPERATING WELLS

Azerbaijan Fireflooding Techniques

Baku BAKINSKIY RABOCHIY in Russian 5 Nov 81 p 2

[Article by A. Bogopol'skiy, manager of the In-Situ Combustion Sector of the Azerbaijan Scientific-Research and Design Institute for the Oil Industry: "When the Formation Burns...."; passages enclosed in slantlines printed in boldface]

> [Text] /During the 1980's the USSR's oil recovery industry should expand its use of new methods for stimulating reservoirs and, thanks to this, for increasing the extraction of crude oil from the ground. The 26th CPSU Congress decided this. There are no few ways to do this, including the process of in-situ combustion--an effective technology for developing deposits, in the creation and improvement of which Azerbaijan scientists and specialists are making an important contribution. However, unsolved technical, organizational and economic problems are hindering accelerated introduction of the progressive method./

In-site combusion (VG) is standing out among modern thermal and physico-chemical methods for stimulating oil deposits with an integrated combining of diverse processes. Combustion, catalysis, cracking, the displacement of the crude by heated water and steam, gases, solvents and surfactants, and so on, are involved. Several of these processes are, taken separately, independent and effective methods for recovering oil.

Superficially, the execution of VG appears to be fairly simple. Compressed air, which, as is known, contains 21 percent oxygen, is pumped into the formation through injection holes, creating at the bottom hole the initial thermal impulse that is necessary for igniting the oil. The fireflood front that has been formed is moved about the formation, followed by a flow of oxygen, displacing the heated and, therefore, more mobile oil toward the bottom hole of the recovery wells. In so doing. underground there occur a high-severity distillation of part of the oil, a combustion of its heavy coke-forming residue as a fuel, and use of the released heat and products for intense and more complete recovery of the crude oil.

The history of development of the VG process is primarily one of studies with a view to increasing its effectiveness and the creation of economically suitable technology for saving fuel and energy. While in the first primitive tests the

amount of crude burned in the formation reached 15-20 percent, according to the assessment of various sources modern technologies enable this amount to be greatly reduced. Work is being done in this area, the potential for a further reduction not having been exhausted.

During 1979-1980, 85 percent of the nation's testing of various VG variants and of their use in recovering crude were conducted in Azerbaijan. In-situ combustion is assigned an important role in long-range plans for the industry. These plans are to a great extent substantiated by the positive results of our republic's mastery of VG.

For the first time in the country, under a task set by the USSR State Committee on Science and Technology, an industrial test was held of so-called wet in-situ combustion (VVG) in the Khorasany area (Leninskiy Rayon). This technology was developed by the All-Union Oil and Gas Scientific-Research Institute, the Azerbaijan Scientific-Research and Design Institute for the Oil Industry and the All-Union Scientific-Research and Design Institute for Thermal Methods for Recovering Oil. Connate or sea water is pumped into the deposit, along with air. Where the ratio is optimal, there is enough thermal energy both for sustaining the combustion and for the forming of steam, which displaces the crude. Figuratively speaking, VVG resembles the process of steam stimulation, which is well known in the oilfields, but in this case the steam generator is sent underground, directly to the combustion front.

Wet combustion, according to the data of the technology's originators, will enable the consumption of the burned oil and expenditures for air to be reduced 1.5-fold to 2-fold, at the same time greatly increasing the formation's productive capacity. Recovery has been raised 65 percent, or by 91,000 tons, at VVG facilities of the Balakhany-Sabunchi-Ramany field.

It should be stressed that VVG designs call for combustion only for half of a deposit, then it is stopped and the injection of unheated water is started. During this concluding stage of the process, the reserve of heat that has accumulated in the formation will be so great that it proves to be adequate for heating the water pumped in and for displacing the remaining crude. It is possible, using this method, to cut oil consumption and expenditures for air for operating needs in half.

VG has been undergoing good development at the field at the northern fold of the island of Artem. An additional 24,000 tons of crude (45 percent) has been recovered by the introduction of this method. Four formations, three of which--of the Kirmak suite, which is the most complicated object being developed in Azerbaijan--are being subjected to stimulation. Two sections are in the sea and are being operated from trestles.

VG technology with the cyclic injection of air was put to a test for the first time in the country on the island of Artem. In comparison with constant injection, this reduces 1½-fold to 2-fold the amount of oil consumed. Time taken to develop the deposit also is reduced. This is of special importance for offshore facilities, where the hydraulic-engineering structures have a restricted service life. The following circumstance is exceptionally valuable: if air delivery and the burning itself are interrupted at times, then, when pumping is resumed, the VG front arises not at the old spot but it is moved forward by a leap--into the oil-saturated part of the formation. Costs for air for such leaps is practically zero, while the amount of oil recovered increases. This variation of the process is more promising

in formations that are very inhomogeneous geologically, which are traditionally unfavorable targets for operation. It is proposed to use precisely this technology there in later VG operations.

The rocks of some fields, which comprise the skeleton of the formation and contain minerals which, with VG, can be used as an additional source of heat and reactants, enable the process to be intensified, oil recovery to be raised, and consumption of the crude to be reduced. Scientists and specialists of AzNIPIneft' [Azerbaijan Scientific-Research and Design Institute for the Oil Industry] and of oil and gas recovery administrations of Artemneftegaz and Ordzhonikidzeneft' have proposed two effective variants of VG in such formations. Special reactants were pumped into one target on the island of Artem and at sections of the Karachukhur and Surakhany fields. They accelerated the advance of the burning front, expanded coverage of the deposit by stimulation, increased the withdrawal of the crude, and, in so doing, all this reduced considerably the process requirements for compressed air.

/The creation, testing and introduction of various VG technologies in Azerbaijan over a number of years testifies to their/ operating effectiveness and to a real increase in the extent of oil recovery. For example, at two groups of Leninneft' and Artemneftegaz wells that had been introduced earlier than others to the VG development method, withdrawal reached in 6-7 years a level to which it could not have been brought in a decade of operation by ordinary methods. This exceeded by 10-20 percent the amount of final oil withdrawal planned under traditional methods.

Along with the obvious achievements, there are still questions that require earnest study. First of all, the scientists are developing more effective methods for regulating and monitoring the amount of oil burning in the formation and for moving the VG front. In this case, /it is considered necessary to save a maximum of the fuel and power resources of the deposits, including avoidance of useless burning of oil in dead zones./ Sections not covered by the stimulation must be found and involved in the process and a more uniform structure of unrecovered oil saturation established after the completion of the VG, especially in formations with essentially inhomogeneous geological characteristics.

/Study on pinpointing areas for effective application of the newest VG technologies should be speeded up at Azerbaijan fields/ based upon more reliable and complete information about the condition of the oil formation. Attention should also be given to longer-term prospects for even more refined development of the deposits after VG has been completed.

/Fireflooding is not practicable on a broad scale without modern air-compressing equipment. Meanwhile, the existing pool of compressors of Azneft' Association requires radical renewal/ because much of the equipment has been running for several decades. In order to promote VG operations in the Leninskiy, Karadag, Kirov and Ordzhonikidze regions and in Artemneftegaz, it is planned to replace the old compressors with improved OVG-type installations which were designed by the Tatar Scientific-Research Institute for Petroleum Machinebuilding and produced by the Chernovitskiy Machinebuilding Plant.

Unfortunately, the start of the introduction of the new equipment cannot be called successful. Two OVG-2 stations were put into operation after a delay of almost a year. At the time of installation, tuneup and maintenance, personnel of Leninneft'

and the Soyuztermneft' Science and Production Administration had to overcome serious design deficiencies. In order to speed up the introduction of three OVG-3 sets, Soyuztermneft' must complete this year the design for the buildup of the oilfield's facilities.

Capital investment in the building of VG facilities, including the compressor stations, is fairly great. About 2 million rubles must be assimilated during the year for the first phase alone of the two facilities at the Khorasany and Umbaki areas. The capacity of the Azneft' construction organizations will not permit this to be done without detriment to the association's other important construction projects. Such a situation tells negatively on the pace and quality of introduction of the VG process. /The question of enlisting additional contracting organizations or of expanding the capital-construction capacity of Azneft' and Kaspmorneftegazprom [Caspian Sea Offshore Oil and Gas Industry Association], taking into account plans for increasing withdrawal from the formations during the 11th and 12th Five-Year Plans, must be examined./

/In 1985 oil recovery in Azerbaijan by the VG method should grow almost 4-fold over 1980's./ Effective solution of the task requires substantial resources for obtaining reliable information about the geological structure of the formations and about the remaining reserves of oil, based upon rational drilling over of the field and the buildup of facilities for development, and improvement of the equipment and technology for recovery and for monitoring and regulating and process.

/At the modern stage of industrial mastery, with VG, as with other new methods, it is desirable to increase the number of comparatively small sections to be stimulated and to concentrate monetary, supply and equipment resources and the efforts of scientists, specialists and worker personnel at several basic fields or a group of deposits as a whole and to create thereat specialized sections or fields. For the integrated solution of questions about introducing thermal methods, the organization in Baku of a division of the Soyuztermneft' Science and Production Association, which a decision of the republic's governing organs calls for, will indisputably be useful./

It is extremely important to improve supply of the oilfields that use the new methods with equipment, apparatus and instruments, concentrating them in specialized production units of Azneft' and Kaspmorneftegazprom for the best and most rational application.

It would seem that during the 11th Five-Year Plan the /training of personnel in technical trades of broad oilfield profile should be increased, in order to provide for skilled tending of all portions of the work on thermal stimulation./ We have in mind the steam-generating and compressor stations and networks thereof, sections for oil recovery and the study of formations and wells, and so on.

The CPSU Central Committee and USSR Council of Ministers decree, "On Strengthening the Work to Save and Make Rational Use of Raw-Material, Fuel-and-Power and Other Material Resources," notes that "During the extraction of useful minerals from the ground, a substantial amount of ore, coal and oil is not being removed." This document requires that provisions be made in every possible way for a reduction in power-intensive and materials-intensive production, maximum extraction of useful minerals from the ground, the wide introduction of scientific and technical achievements for raising the utilization effectiveness of fuel-and-power and

raw-material resources, the creation of the systems of machines required for this implement of labor, and the first-priority allocation of capital investment, equipment and construction-organization capacity for taking steps to save material resources.

The necessity for speeded-up introduction of progressive methods for raising the yield of formations in Azerbaijan and /the difficulties of the new stage of development of oil recovery that arise because of this must not be underrated or simplified. The urgent problems should be solved without procrastination./

Tuymazy Operating-Well Maintenance

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 15 Nov 81 p 2

[Article by A. Akhmetshin, chief of the Tuymazneft' Oil and Gas Recovery Administration (Oktyabr'skiy, Bashkirskaya ASSR): "So Recovery Will Not Be Reduced"]

[Text] The celebrated Tuymazy field has been in the late stage of development for a long time now. This means that its golden days have ended and, as always happens, oil recovery has begun to drop. It is as if there is nothing you can do about it, so you have to be reconciled to a natural circumstance. Indeed, the formations have been producing fuel for more than 40 years, and water encroachment in the main Devonian horizons has reached 95 percent--in simpler terms, 13 times as much water is being recovered as oil. It is considered that a major portion of the fuel reserves has been recovered. But indeed, the deposit is not completely exhausted.

That is why the oilfield workers of our NGDU [Oil and Gas Recovery Administration] have decided to defy what would seem to be the inevitable and undertake, first, to reduce the rate of fall in recovery, and then to stabilize it at 4 million tons--to hold it at the level achieved 4 years ago.

Highly productive electric centrifugal pumps and treatment of the bottom-hole zone with reactants and carbon dioxide were introduced, and heat, gas and chemical stimulation of the formations and other actions were applied. All this helped at once to boost the recovery of fluid not only in individual wells but also in the field's formations as a whole. Experience gained by the collective over many years suggests: the methods must be varied at the different sections. At one of them--the Staro-Tuymazy area--an increase in the water injected into the formation was begun gradually. The procedure that we organized lends hope, since about 200,000 tons of additional oil were obtained, and the rate of drop in recovery has been cut almost in half.

Advanced operators M. Kazakov, Kh. Kazimov and S. Khalyafeyev came out with an interesting initiative. They called upon the oilfield workers to promote start-to-finish competition in all the production elements of a single technological chain under the motto: "The maximum amount of oil from each well!" This meant that now, with the joint efforts of underground repair brigades, mechanics and electricians, concern about the status of recovery capacity will be concrete, since such a competition also imparts a feeling of responsibility for the sections assigned and it increases mutual exactingness. Take this instance, for example: previously, during the operation of underground repair brigades, the proper watchfulness was absent, and so it happened that the repairers ran equipment downhole without steaming,

and it became worn more quickly. Nobody knew about this. Now you do not do this: the oilfield operators have begun to monitor the conduct of such work strictly.

Moreover, the competition initiators proposed to use reactant for dealing with paraffin deposition on equipment already set up and to take other measures. They also developed an attachment for pumping chemicals into the well's annular space. With strict observance of the schedule for such operations, the period between repairs not only was extended but oil recovery also was increased.

All this produced certain results. But it was clear that, under the situation that had been created, other drastic measures also were needed. And they were found. It was necessary to study all the wells and to take a series of steps aimed at raising output from below ground--oil-recovery operator Hero of the Soviet Union T. Nurkayev came to this conclusion. The job turned out to be difficult, since a schedule had to be made up for reequipping the wells and for conducting equipment-renewal operations at each of them, and to regulate the withdrawal of fluids.

But when we did all this work, the oilfields behaved as if they had taken on a new life. Especially remarkable was the fact that the formation's yield grew noticeably: annual growth in recovery through the measures conducted at the initiative of the innovators was more than 30,000 tons.

But other problems were bared during all these operations. One of them had worried oilfield workers for a long time. Everyone understood that the most important principle in oil recovery is timely prevention of interruptions in operation of the wells, to prevent equipment downtime. But strange as it may seem, extraordinary specialization by production subunits led to a different nature of downtime. Let us take a look, for example, at what the role of the oil-recovery operator had been reduced to. He made the rounds of the wells and looked to see whether the equipment was in operating order. He went on these foot patrols for 4 hours. He was simply an observer of all that occurred at the wells. When some insignificant repair had to be made on the pumping jack that would take 30 minutes, the operator recorded what was broken and just reported the breakdown to the repair workers. But they were not always on the spot, and often the well was idled.

We studied carefully the experience of oilfield workers of the country's other oil regions. It was clear that right now, with integrated automation and remote control of production facilities being introduced everywhere, new demands should be presented for well-servicing as well. Primarily, all types of work should be combined in time and place, in order to achieve minimal labor expenditure.

Such harmony, I would call it, in the work became possible after we had established integrated teams, with each of them assigned to 60-80 wells. This, for example, is how the team under Kh. Kazimov constructed their operation. He is an operator of the fifth rank and is also, at the same time, a brigade leader of a team on which there are 5 operators. Each of them has mastered two or three allied trades. In the morning the brigade leader, arriving at field No 4, is interested primarily in the operation of the wells. His concerns have been increased: planned preventive maintenance of the equipment must be performed on a previously compiled schedule, and if a breakdown has occurred he quickly eliminates it. Team members are always ready for a trip to the wells. They have at their disposal a tractor with a mobile housing unit, in which are a set of tools and a welding unit.

With this method for servicing recovery capacity, it has become possible to solve still another problem. Previously, women did the sampling and measuring of the oil. They were not able for days to cope with their obligations, so the tasks of sampling (and this is an important indicator of the field's operation) often was interrupted. Members of the integrated team took these operations upon themselves and carried them out simultaneously. The number of operators of the third rank who had been making the rounds of the wells has now been cut to 3 or 4 persons at each field.

Of course the workload on the team has been increased, but then the operator's work has also become richer in content, and they manage to do everything in the course of a day, and they have no forced downtime now. Sophistication in servicing of the equipment also has risen. The operator has become the full boss of his wells, and he himself is concerned about their continuous operation. Previously, the equipment was lubricated from time to time but now it is done on a precisely determined time schedule, so the equipment operates longer.

Of course, each team member also has been given a material incentive: the brigade leader is paid 10 percent additional wages for managing the team, and his helpers are paid as much as 15 percent additional wages for the combining of trades and for sampling work.

As for the allowance of operators for current repair of well equipment, then it all becomes simpler here: prior to creating the integrated teams, and there are now 27 in our administration, we organized training. Each operator, after mastering an allied trade, took examinations and obtained the corresponding papers.

The new way of organizing the work produces much: for the NGDU as a whole, the operating factor for the wells has been raised from 0.940 to 0.970. This is a rather high indicator. Moreover, operating time between repair of the wells for that same field No 4 has been increased from 335 days to 398, and, for the administration as a whole, from 227 to 316 days.

The advantages of the new method for servicing wells are obvious. It is this which has permitted competition under the "workers' relay" principle in all links of the technological chain to be organized more concretely. Today the collective is also conducting the development of new fields, and it regularly overfulfills plans for fuel recovery.

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COAL-BASED SOUTH YAKUTIA PRODUCTION COMPLEX BUILDUP PROGRESSING

Moscow EKONOMICHESKAYA GAZETA in Russian No 36, Sep 81 p 5

[Article by G. I. Chiryayev, first Secretary of the Yakutskaya Oblast CPSU Committee: "The Complex Gathers Strength"]

[Excerpts] In Accordance with a Special Program

The 26th CPSU Congress put forth important tasks for the further development of the South Yakutia TPK [Regional Production Complex]. The "Main Directions," which the congress approved, noted: "Continue to form the South Yakutia Regional Production Complex and complete the construction of the coal strip mine, the coal preparation plant and the first phase of the Neryungrinskaya GRES."

Among the first-priority tasks here, it is necessary to bring coal-mining capacity up to a minimum of 30-40 million tons per year in the long term, to build the Denisovskaya Underground Mine and to promote construction of the Chul'makanskaya Underground Mine. A coal-mining complex is now being erected. With this, the basis has been laid for large-scale assimilation of South Yakutia's riches.

The raw-material resources that are available in South Yakutia have been considered here. The scale and quality of the basic and auxiliary raw materials that were explored by the geologists, the uniqueness of finding them in one region, and the presence of vast energy resources provide all the prerequisites, including economic desirability, for creating in South Yakutia a new, large coal and metallurgy base for the country. The metallurgical plant should become the core enterprise of the South Yakutia Regional Production Complex.

The congress considered our recommendation. It is written in the "Main Directions": "Develop a feasibility study for assimilation of the iron-ore deposit in South Yakutia and also for the construction of the Berkakit-Tommot-Yakutsk Railroad."

The railroad to Yakutsk is an especially important facility. The republic's contribution to the country's economic development could be much greater with solution of the transport problem. River transport cannot haul the sharply rising flow of cargo. Enormous harm is inflicted on the national economy by the lack of roads, the excessively lengthy time spent en route, and the limited potential of aviation and automotive transport. The advent of the railroad to Yakutsk will play a genuinely revolutionizing role in development of the productive forces of this region

of the country and speed up social development in the vast district, and, consequently, it will have colossal consequences. Henceforth, everyone will have to work persistently so that the railroad will be built on time and at least expense. At this stage we face the task of creating all the conditions for successful work of the Mosgiprotrans [Moscow State Design and Survey Institute of the USSR Ministry of Transport Construction] expedition so that development of the TEO [feasibility study] will be completed in 1982.

The gold-mining industry will be further developed in the TPK, and a mining and upgrading combine for producing apatite concentrate and petrochemical-industry enterprises will be built.

We are aware that the further development of the South Yakutia Regional Production Complex has been charged to the republic's party organization, the Yakutskgeologiya [Yakutsk Geological Association] and the geological exploration expeditions that are working on the TPK's grounds, and that it is an extremely important task. In 3 years the iron-ore reserves in the Chara-Tokko and Yuzhno-Aldan regions are to be explored, deposits of nonmetallic and building materials are to be evaluated, and baseline data on hydrogeology are to be prepared. A detailed exploration is to be completed of the Denisovskiy coking-coal field in 1982, of the Seligdar apatite field in 1984.

Initiative and Responsibility

The Yakutskaya Oblast CPSU Central Committee has worked out a long-range plan for organizational and political measures for realization of the 26th CPSU Congress decisions. They have been widely discussed at an oblast committee plenum, and they have incorporated concrete recommendations of party organizations, state and economic organs, and working collectives. The plan has been designed for the next 3 years.

To speak more specifically, this is a drive for a rise in the effectiveness of production and the quality of work, the economical use of all types of resources, and the creation and strengthening of the supply and equipment base for industry, transport, agriculture and capital-construction enterprises.

A special question is the strengthening of plan discipline. In so doing we proceed from a statement of L. I. Brezhnev's report at the 26th CPSU Congress: "The party has always viewed the plan as the law....The plan is the law, because only its observance will provide for the coordinated operation of the national economy." The oblast party organization has gained known experience in working without lagging enterprises. Actively included in this matter are party, soviet and economic organs and public organizations. The responsibility of personnel is being raised in every possible way. Additional production reserves are being sought. The republic's industry has already been working for 3½ years now without enterprises that lag in output realization. However, in so doing, a number of enterprises are not coping with the tasks for labor productivity growth, and this is the main indicator of effectiveness.

Deficiencies in the erection of the South Yakutia coal complex are arousing serious concern. The builders have done a large amount of construction and installing work. This year Yakutuglestroy [Combine for Coal-Industry Facility Construction in the Yakutsk Coal Basin] has improved its activity somewhat. However, the tasks are so

important that the current state of affairs does not satisfy us. A buildup in the construction pace is required in order to introduce facilities into operation by the deadline. This relates also to another construction organization--Neryungrigresstroy [Administration for Construction of the Neryungrinskaya GRES] of the USSR Ministry of Power and Electrification. The ministry must take energetic steps to insure timely introduction of the facility's first phase.

* * *

All the work that is being done will help to maintain high labor and political activeness. This was telling on the work results for the first half of 1981. The plan for industrial-output realization was fulfilled 103.6 percent, the task for labor productivity growth by 103.1 percent. Plans for mining coal, recovering gas and extracting other useful minerals, for generating electricity, and for producing cement and commodities for cultural and domestic-amenity purposes and for household use were overfulfilled. It was also encouraging that fixed-capital introduction exceeded plan tasks by 17 percent. Plans for construction commodity output volume were overfulfilled.

Unfortunately, there are cases in the republic of a lack of proper monitoring over progress in the fulfillment of plans and commitments. I have in mind primarily housing construction. Although the plan for introducing housing in the first half of the year was fulfilled 108 percent, some organizations did not cope with the task.

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CONTENT, PROPERTIES, BEST USES OF KANSK-ACHINSK COALS DISCUSSED

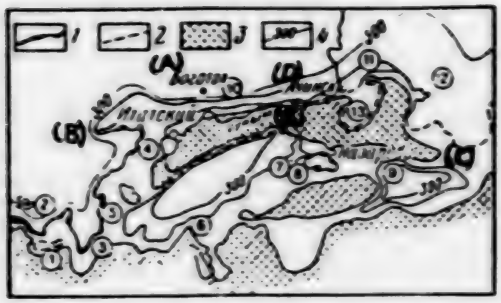
Moscow RAZVEDKA I OKHRANA NEDR in Russian No 9, Sep 81 pp 5-9

[Article by K. V. Gavrilin and T. D. Antonova (of PGO Krasnoyarskgeologiya): "The Rational Use of Kansk-Achinsk Basin Coals"]

[Text] The "Main Directions for the Economic and Social Development of the USSR During 1981-1985 and During the Period up to 1990" calls for: the development at an outstripping pace of coal mining by the more effective strip-mining method, acceleration of the erection of facilities of the Kansk-Achinsk Fuel and Power Complex, and an increase in coal mining in this region. The effectiveness of the complex's operation is linked to a great extent with correct choice of the purpose of and methods for processing the coals, taking into account the peculiarities of their quality. The properties of this basin's coals have been studied by specialists of PGO Krasnoyarskgeologiya, PGO Zapsibgeologiya and many institutes. The thickest coal seams, which have been formed into three stratigraphic levels that are divided by intervals of rock 150-250 meters thick, are of industrial value. The coal seam on the lowest level is 5-7 meters thick, the middle level 10-20 meters, the upper level 35-60 meters. Several small deposits are associated with the first phase of coal deposition. Three large deposits--the Nazarovskoye, Abanskoye and Pereyaslovskoye--are confined to the seam that forms the middle phase, and the largest number of deposits--the Barandatskoye, Berezovskoye, Borodinskoye and others--to the seam that was formed in the last phase of coal deposition (figure 1). Coal resources suitable for strip mining in the amount of 142.9 billion tons are distributed among levels as follows: lowest 4.5 percent, middle 27.5 percent, upper 68 percent.

The basin's coal is basically dense, brown, humic, low in bituminous content and low in ash. The coals are represented by the classes of hoelitoliths (60-90 percent), fusainoliths (5-15 percent) and lipoidoliths (3-20 percent). Most widely distributed are dull and semidull striated coal. The material composition and properties of the coals of the various stratigraphic levels are somewhat varied. The coals of the lowest level have a complicated petrographic composition and contain an increased amount of mineral impurities. The composition of the coal of the middle level's thick seam is better, but in some deposits, at the Nazarovskoye, for example, a high seminite content (up to 32 percent) is observed. The main seam, which was formed in the concluding phase of coal deposition, is marked by a more consistent and more favorable petrographic composition. In the fields of the basin's western part this seam's coal is represented 73-80 percent by components of the vitrinite group. The seminite and fusainite content reaches 5-10

Figure 1. Diagram of the Western Part of the Kansk-Achinsk Basin.



Emergence of coal seam under alluvium:

1. Established.
2. Conjectural.
3. Subjacent pre-Jurassic sediments.
4. Contour of coal seam under 300 meters of soil.

In circles--numbers of the fields:

1. Dudetskoye.
2. Tisul'skoye.
3. Barandatskoye.
4. Itatskoye.
5. Uryupskoye.
6. Berezovskoye.
7. Altatskoye.
8. Nazarovskoye.
9. Serezhskoye.
10. Bogotol'skoye.
11. Achinskoye.
12. Borovsko-Sobolevskoye.
13. Uluyskoye.

A. Bogotol. B. Itatskiy. C. Nazarovo. D. Achinsk. E. Chulym River.

percent, leyptinite 3-5 percent, and, at the Barandatskoye deposit, as much as 20 percent. Average indicators of quality of the coal of the main deposits are shown in table 1.

Table 1

(1) Месторождения	(2) Уровень угленакопления (свита)	(3) Петрографический состав, %		(4) Качественные показатели						(5) Выход смолы при полукоксовании, %
				(6)	(7)				(8)	
		ВТ	Л	W^P, %	A^C, %	V^{daf}, %	$S^C_{об}$, %	C^{daf}, %	$Q^P_н$, кДж/кг	
				Группа Б1 (9)						
(10) Боготольское	III	—	—	42	11,5	49	0,9	69,5	12 500	4,0
				Группа Б2 (9)						
Назаровское (11)	II	49	1	37	12,0	47	0,6	70,5	13 500	5,4
Абанское (12)	II	90	2	34	9,5	47	0,4	71,3	15 150	5,0
Итатское (13)	III	73	8	40	11,5	46	0,7	70,5	13 400	5,0
Барандатское (14)	III	62	20	36	7,0	46	0,3	71,5	15 150	9,0
Урюпское (15)	III	79	3	34	8,0	47	0,3	71,0	15 500	8,2
Бородинское (16)	III	49	2	33	9,5	47	0,2	73,1	16 000	6,8
Березовское (17)	III	79	—	32	7,0	48	0,3	71,2	16 000	6,0
				Группа Б3 (9)						
(18) Переясловское	II	—	—	26	15,0	49	0,3	73,3	18 000	6,9
Большесырское (19)	III	79	1	22	6,0	46	0,2	74,1	20 030	—

Key:

1. Fields.
2. Level of coal deposition (suite).
3. Petrographic composition, percent.
4. Qualitative indicators.
5. Resin yield during semicoking.
6. Stratal water, percent.
7. Ash content, percent.
8. Combustion heat, kilojoules/kilogram.
9. Groups Б-1, Б-2, Б-3.
10. Bogotol'skoye.
11. Nazarovskoye.
12. Abanskoye.
13. Itatskoye.
14. Berezovskoye.
15. Uryupskoye.
16. Borodinskoye.
17. Berezovskoye.
18. Pereyaslovskoye.
19. Bol'shesyrskoye.

The degrees of metamorphism of the coals and their heat-engineering characteristics are not alike at the various fields but are functions of the structural position of the latter and the stratigraphic and hypsometric depth of the seam. The thickness of the coal-bearing deposits and the complexity of the structure that encloses them increase toward the south. Regional metamorphism also increases in that same direction. The operating moisture and lowest specific combustion heat of the coal ($Q^P_н$) are more objective indicators of the degree of metamorphism of the coals, which define their heat-engineering properties. Other features in the environment of the Kansk-Achinsk basin are less indicative. The brown coals of East Siberia and the Far East are divided, in conformity with GOST's [State All-Union Standards], into three industrial groups in accordance with the first of the indicated parameters: Б1 (W^P > 40 percent), Б2 (W^P is 30-40 percent) and Б3 (W^P < 30 percent). The modern level of understanding of the basin's coal allows said system of classification to be considered too schematic. Thus, the coals of almost all the basin's fields, except for the Bogotol'skoye, Balakhtinskoye, and Pereyaslovskoye, are combined into group Б2, although their heat-engineering properties vary considerably. The combustion heat of the Itatskoye and Berezovskoye coals, which belong to the first group, differ by more than 25 percent. Considering the properties of the coals and the consistency of their changes, it is desirable to divide groups Б2 and Б3 into three subgroups, for example, Б2-1, Б2-2 and Б3-3. In so doing, the stratal moisture of the coal should be used as the main classification parameter, while the lowest heat of the coal's combustion can be an auxiliary parameter. The range of variations in moisture and the corresponding values for combustion heat are shown in table 2.

Table 2

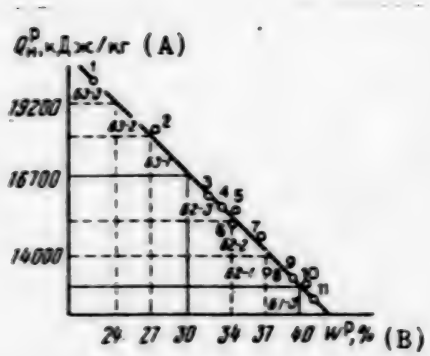
(1) Подгруппа	Б1		Б2		Б3	
	(2) W^P, %	(3) $Q^P_н$, кДж/кг	(2) W^P, %	(3) $Q^P_н$, кДж/кг	(2) W^P, %	(3) $Q^P_н$, кДж/кг
1	—	—	40—37	13 000—14 000	30—27	16 700—18 000
2	—	—	37—47	14 000—15 200	27—24	18 000—19 200
3	44—40	<13 000	34—30	15 200—16 700	<24	>19 200

Key:

1. Subgroup.
2. Stratal water.
3. Combustion heat, kilojoules/kilogram.

Bogotol'skoye coal (figure 2) is the least metamorphosed (Б 1-3), and close to it in quality are the coals of the Nazarovskoye, Borovsko-Sobolevskoye and Itatskoye deposits (Б2-1). The Barandatskoye and Abanskoye (Б2-2) and Uryupskoye, Berezovskoye and Borodinskoye (Б2-3) coals, which have a moisture content of 32-36 percent and a combustion heat of 14,500-16,000 kilojoules/kilogram, have average metamorphism. The next group includes the more mature Balakhtinskoye and Pereyaslovskoye coals, whose moisture content is less than 30 percent. The cited values for moisture content of the coal are characteristic for the bedding interval of the seam 50-100 meters from the surface, that is, for the area of primary working. The moisture content in the coal drops off consistently with submergence

Figure 2. Grouping of Kansk-Achinsk Basin Deposits by Stratal Moisture Content of the Coals.



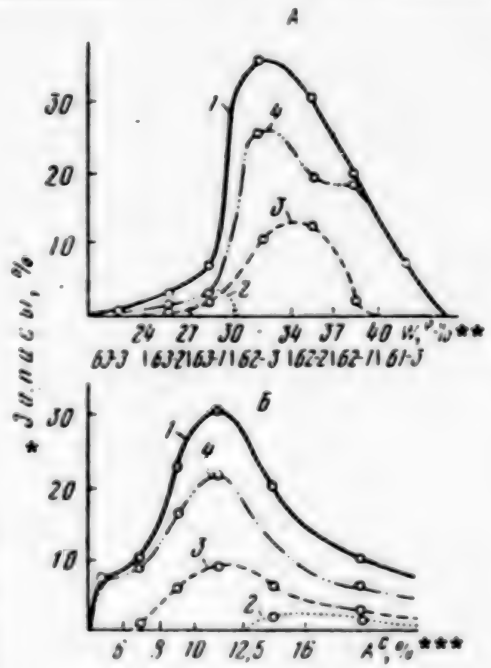
Fields:

1. Bol'shesyrskoye.
2. Pereyaslovskoye.
3. Berezovskoye.
4. Borodinskoye.
5. Uryupskoye.
6. Abanskoye.
7. Barandatskoye.
8. Nazarovskoye.
9. Borovsko-Sobolevskoye.
10. Itatskoye.
11. Bogotol'skoye.

A. Combustion heat, kilojoules/kilogram.
B. Stratal water, percent.

of the seam. For example, at the Barandatskoye, Itatskoye, Uryupskoye and Berezovskoye deposits, the reduction of moisture per 100 meters of overburden is 1.7-2.5 percent. And combustion heat increases correspondingly by 800-1,150 kilojoules/-kilogram. Consequently, at depths of more than 200 meters, Itatskoye deposit coals have to be switched from the Б2-1 subgroup to Б2-2, and the Barandatskoye from Б2-2 to Б2-3. A chart of the distribution of the total coal resources by degree of their metamorphism indicates that the overwhelming portion of the reserves are in the Б2-2 and Б2-3 subgroups (figure 3A). Large processing enterprises should, therefore, be oriented toward the use of such coals.

Figure 3. Distribution of Kansk-Achinsk Basin Coal Reserves.



Key:

A. By technological group.
Б. By ash-content group.

Coal reserves suitable for strip mining:

1. Total.
2. Lower (early Jurassic deposition).
3. Middle phase.
4. Upper main phase.

* Reserves, percent.
** Stratal water, percent.
*** Ash content, percent.

The coal's composition by element is fairly constant. Group Б1 coals contain less than 71 percent carbon, group Б2 71-73 percent and group Б3 more than 73 percent. The hydrogen content is 4.6-5.3. The coals of all the deposits are low in sulfur except for limited areas of the Itatskoye and Bogotol'skoye deposits. The sulfur content is in the 0.2-0.4 percent range. According to laboratory data, a small yield of low-temperature tar (up to 4-6 percent) is obtained from the coal of most deposits when the coal is semicoked. Only at the Barandatskoye deposit does the yield of low-temperature tar reach 10 percent, because of which these coals merit special

attention. The bitumen content is not great, which makes briquetting of the coal difficult and causes poor water resistance of the briquettes. The ash content of coals of the main seams is not great, on the whole, and it is a function of their stratigraphic position and thickness. A higher ash content (15-20 percent) is characteristic of coals of the lowest seam (see figure 3б). Coals of the thick seam of the last phase have an ash content of 8-16 percent, and the thickest Berezovskoye coal 4-10 percent. An inverse dependence is noted between seam thickness and the ash component of its coal. Minimal ash content is observed at sections of increased thickness.

Ash composition is not consistent. In low-ash coal (4-7 percent A^c) of superthick seams, the ash content is marked by increased content (up to 50-60 percent) of oxides of calcium and magnesium. As the amount of ash in the coal increases, its material content changes consistently, in particular, when the ash content is 15-20 percent, the silica content rises to 50-60 percent and the amount of oxides of calcium decreases correspondingly. Alkali metals (K_2O + Na_2O) are contained in an insignificant amount (less than 1.0-1.5 percent); this is not connected with the ash content. It has been established that at the Berezovskoye and Uryupskoye deposits, the amount of alkali in the ash increases with submergence of the seam, reaching 5-6 percent at depths of more than 200 meters. This fact requires further study. As the composition of the ash changes, so do its properties. A high content of oxides of calcium and magnesium provokes a sharp rise in the ash's melting temperature. The minimal melting temperature, which is 1,420-1,470 K, is observed where the ash content is 8-12 percent, CaO is 20-33 percent and SiO_2 is 30-45 percent. With reduction of the ash to 4-6 percent or a rise of it to 15-20 percent, the melting temperature rises to 1,750-1,850 K. These properties of the coal determine the methods of burning them and of removing the slag, factors which are especially important to consider when designing the large electric-power stations of the first phase of KATEK [Kansk-Achinsk Fuel and Power Complex]. In accordance with the schemes that have been adopted, coals with easily melted ash are burned in high-temperature fireboxes and the slag is removed in liquid form, but coals with high-melting point ash are burned in fireboxes with moderate temperature levels and the slag is removed in solid, unmelted form. Fireboxes from which liquid slag is to be removed are simpler to build and are less expensive. All coals with an ash content of 8-15 percent can be burned in them, that is, an overwhelming portion of the basin's coals. More complicated systems of combustion are required for the low-ash varieties, which are concentrated in limited areas of the Berezovskoye, Uryupskoye and Barandatskoye deposits and whose reserves are relatively small (9 percent of the basin's reserves). At the same time, these coals are a very valuable industrial raw material. A practical scheme for energy-technology conversion of the basin's coals, the foundations of which were developed by Z. F. Chukhanov, has been proposed by the Power Engineering Institute of the USSR Academy of Sciences. The obtained output includes [1] a semicoke with a combustion heat of 27,000-28,000 kilojoules/kilogram, a combustible gas (18,000-21,000 kilojoules/-kilogram), resin (35,000-42,000 kilojoules/kilogram) and briquettes (28,000-28,500 kilojoules/kilogram). The resin can be used for briquetting semicoke, as a furnace oil, or as a raw material for chemical processing. The gas will serve as a good power-generating fuel. The brown-coal semicoke is a transportable power-generating fuel and a component of the coal charge for coking. Its useful characteristics are not only a low ash content (9-12 percent) but also a favorable ash content, in which carbonates occur, reducing flux consumption considerably during the blast-furnace process. Let us note that the economy of using semicoke as a leaning additive is fairly high.

Another promising area of the future use of Kansk-Achinsk basin coals is hydrogenation, as a result of which the coal's organic mass is turned into a liquid product suitable for obtaining boiler and motor fuel, as well as a number of chemical products. The bases of the indicated process were developed by IGI [Institute of Mineral Fuels]. The degree of conversion of the coal's organic mass reaches 90 percent, and the yield of liquid fuel is 85-87 percent. Industrial processing of the coals into liquid fuel will increase substantially the country's energy potential. Despite the diversity of the products of processing, approved requirements for the raw material for conducting both processes still do not exist. In the opinion of IGI specialists, it is necessary to subject a coal with an ash content of less than 6 percent to semicoking. Then the coke's ash content will meet the standards [3]. VUKhIN [Eastern Scientific-Research Institute for Coal Chemistry] specialists also have noted the special value of the low-ash (8-10 percent) semicoke with a carbonate ash for metallurgy [4]. It is indicated also that, for hydrogenation, coals with an ash content of less than 6 percent should be used [2].

Apparently low-ash coals should be subjected to both energy-technology processing and hydrogenation, the more so since their combustion in fireboxes involves great difficulties. Such coals are concentrated basically at reserve sections that have been prepared for first-priority mastery at three of the largest deposits--the Berezovskoye, Barandatskoye and Uryupskoye. The methods and scale for processing coal of the planned strip mines has not been adopted with finality, and the correct choice of them is of great national economic importance. The optimal solution of this question is possible only on the basis of a thorough analysis of the geological, economic and social factors, as well as of the resources and location of coals with various characteristics.

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11409
CSO: 1822/40

FUELS

COMPLAINTS OF TYUMEN' OILFIELD WORKERS DESCRIBED

Minsk SOVETSKAYA BELORUSSIYA in Russian 4 Nov 81 p 2

[Article by S. Mazurok, chief of Belorussian Drilling Administration for Oil-Well Drilling in West Siberia: "...But We Are Not Letting Anyone Down"]

[Excerpts] The Belorussian Drilling Administration for Oil-Well Drilling in West Siberia has met the goals for the first three quarters of the year for all indicators. The press has already told about our labor successes, so I shall not repeat them. I will note only: these successes were not achieved by easy work. Behind the dry figures of the summary are sleepless nights, nerves and salty sweat, and, I would say, heroic work by our collective of more than 2,000 people.

In 2 years in all, the administration had to meet the goals of the Tyumenites for derrickbuilding and drilling, although they had been drilling oil wells in the north for more than 10 years and they had at their disposal high-capacity production facilities and repair centers, adequate equipment and stable supply. And, as they say, the "local turf" also helps.

We had no personnel turnover. People came to us willingly, not just from Belorussia but also from neighboring Ukrainian and Russian oblasts. Nevertheless, it must be noted that conditions have not been easy. In the summer there is the heat and rainy weather, and swarms of gnats make life impossible, and in the winter there is the severe cold. What is more, we work 12 hours per day, and at times even longer if the job and the situation require it. In our view, people are attracted not only and not so much by the high wages as by the task itself, which is of special state importance--the assimilation of West Siberia's wealth, a task just as honorable as assimilation of the virgin and fallow lands or construction of the BAM [Baykal-Amur Mainline].

Moreover, most workers work under the expeditionary rotating-duty method. After working in the North for 2 weeks, a person is returned home by airplane and has 13-14 days at his discretion. Our collective consists mainly of young people. Having at his disposal a substantial reserve of free time, each one who wants to do so can study by correspondence in a tekhnikum or institute. If a person wants to take a vacation outside his home, the trade-union committee will issue him a ticket to a vacation home or for a trip to a city rich in our people's revolutionary, military or labor glory. Tickets are issued for sanatoria and vacation housing in the Crimea and Caucasus, and also for foreign trips. Housing is being built for us at

Svetlogorsk and Rechitsa. In Svetlogorsk the children of the blue-collar and white-collar workers are provided completely with children's institutions.

Perhaps the Belorussian Administration can work still better? As a supervisor, I answer: yes, it can. The collective has survived, become stronger and hardened to the North's conditions, and it has a lot on its shoulders. I will say more: Belorussia's oilfield workers more than once have set an example for other drilling administration.

But in order to work better it is necessary to resolve those problems and to eliminate that interference which have pursued us from the first day of work in Tyumenskaya Oblast. I will not talk about such major problems as the insufficiency of casing, the delayed embanking of roads and of platforms for erecting the drill rigs by specialized administrations of Nizhnevartovskneftegaz Association. This is well known to higher authority. I will emphasize attention to those questions that can be answered positively in our republic.

At the Samotlor field, where we now have seven drill rigs, literally speaking a catastrophic situation has prevailed. The only Uragan prime mover has become worthless and unsuitable for repair. Without it we cannot be on time when hauling drilling equipment and units and components that weigh tens of tons. The derrick erectors are building drill rigs at a shockwork pace, but the rig is idle just because no one has delivered mobile housing units and dining accommodations to the "cluster."

I will cite an example. On 20 September we finished drilling of the last well at cluster 1019. In order to prepare the wells for turnover to the oil-recovery workers, it was necessary to disassemble the drill rig on time and transfer it to another cluster. It is easy to say--to transfer. But on what? We did not even have at hand equipment for delivering a boom crane to the cluster, by means of which the drill rig is knocked down to the ground. And so it happened that completed wells were delayed in producing oil.

Finally, we disassembled the rig. Tractors dragged the equipment apart at the sides, and then we begged other administrations for equipment to haul it to another cluster, spending severalfold more time than is allowed. Moreover, such a method of disassembling drill rigs shortens their life and prolongs and increases the cost of building the derricks. But if we had had Uragans on hand, we would have coped with all this without the slightest expense.

So it happens that the derrickbuilders try to build drill rigs in record time, the drilling brigades save every minute during well penetration, and all the administration's departments and services work under tension (indeed, our product is a completed well), but then the time won is lost in vain.

There is not enough loading equipment, even of the ordinary kind, or of buses. Often, after finishing a night shift, the people go on foot to another cluster, where they live, walking 5 or even 10 kilometers. There is no transport to haul them. And is it easy for a person, after 12 hours of work, to walk for even a kilometer in the autumn slush or 40-degree below zero weather along Samotlor's taiga roads?

Incidentally, Uragans and MAZ's are produced in Belorussia. The Tyumen' people have this equipment. It has proved itself well in the North. But Belorussia's oilfield workers do not have this equipment. We need at least two or three Uragans and several MAZ's with sidewalls. This is one of the paramount problems upon whose solution the Belorussian Drilling Administration's work results depend, not just in the future but in the immediate future.

We have to assimilate new oilfields and, by the end of the 11th Five-Year Plan, to complete a million meters of penetration of oil wells. We are already doing preparatory work at the Vyngapur field, in the Yamal-Nenets National Okrug, where drilling should begin in January 1982.

11409
CSO: 1822/42

NEW PRINCIPLES FOR PRICING MINERAL RESOURCES EXPLAINED

Moscow EKONOMICHESKAYA GAZETA in Russian No 46, Nov 81 p 10

[Article by V. Cheplanov, director of the NII [Scientific-Research Institute] for Price-Setting of USSR Goskomtsen [State Committee for Prices] and professor; and Yu. Chernegov, institute section manager and professor: "Mineral Resources and Prices"]

[Text] Our country possesses a high-capacity base of mineral raw materials, enough for long-term development of the Soviet economy. The USSR also provides a substantial portion of the mineral resources requirements of the countries of socialist collaboration.

The country's requirements for mineral raw materials are constantly growing. Therefore, rational consumption thereof is of special importance. Saving them yields a meaningful national economic benefit, since the extraction industry requires large amounts of capital investment--its share of total investment in industry is about 40 percent. A large number of the people employed in industry work for the extracting branches.

Taking Actual Conditions into Account

As the scale of production in previously developed regions increases, the mining and geological conditions for extracting useful minerals worsens, and capital investment in the development of new fields in the country's northern and eastern regions increases. Expenditures for equipment and costs for preserving the environment are increasing. All this leads to an increase in production outlays for the extractive branches of the economy. As a result, the wholesale prices established for 1967 have ceased to reflect actual production conditions. Price levels for certain types of resources have proved to be lower than current costs, and this, of course, does not help to strengthen cost-accounting attitudes.

For example, the prime production cost for coking coal at the start of the current five-year plan was 30 percent higher than the wholesale price in the Donbass [Donets Coal Basin], 8.3 percent higher in the Kuzbass [Kuznetsk Coal Basin], 7.2 percent higher in the Karaganda Coal Basin, 21.6 percent higher in the Chelyabinsk Coal Basin, and more than 35 percent higher in the Moscow Coal Basin.

The same picture is also observed in regard to oil recovery. In Belarusneft' Association the prime production cost exceeded the wholesale price by 3.7 percent, in

Bashneft' by 10.1 percent, in Azneft' by 11.4 percent, in Ukrneft' by 13.8 percent, in Kuybyshevneft' by 23.3 percent, in Stavropol'neftegaz by 29 percent, and in Krasnodarneftegaz by 52.8 percent.

The overall revision in industry of the wholesale prices and rates that will be introduced on 1 January 1982 has enabled the prevailing higher level of production outlays in the raw-materials industries to be considered. At the same time, the price ratio for interchangeable types of mineral raw materials was improved. The new price lists consider more fully their qualitative parameters. The levels and ratios of wholesale prices for mineral raw materials were established in such a way as to encourage maximum extraction of useful minerals from the ground and the integrated and intensive processing of them.

The more complete reflection of the socially necessary expenditures for exploration for and the extraction and processing of mineral raw materials and fuels in prices and the surmounting of the unprofitableness of various extractive branches of industry will create favorable conditions for strengthening cost accounting and the rational use of natural resources.

The Principles of Differentiation

Encouragement of development of the mining and fuel industry by prices works in a number of directions.

First of all, prices play an important role in resolving questions of the optimal siting of production facilities and the distribution of capital investment in the extractive industries. When wholesale prices were revised, for example, they were differentiated by coal basin, taking into account the prospects for the basins' development and their national-economic significance in the country's fuel-and-power balance.

For steam coals, the highest level of profitability, which is 2.4-fold to 2.6-fold higher than the level for the industry as a whole, is specified for the Ekibastuz and Kansk-Achinsk Coal Basins. At the same time, the wholesale prices for the coals of these basins are lower by a factor of 3.4 to 3.8 than the average level of wholesale prices for steam coal, thus intensifying the economic motivation to build electric-power stations based on these coals. The relationship of prices to grades of coal, taking its quality into account, also was improved. The prices established for Ekibastuz coal, for example, are based on the specific combustion heat.

For coking coals, the prime production cost is lower in the Karaganda basin than the existing wholesale price by 16.8 percent, and in the Donbass, mining of this coal is unprofitable. Now the unprofitability has been eliminated, and the highest profitability versus prime production cost has been set for the Karaganda Coal Basin, the lowest for the Donets Coal Basin.

That same principle also lies at the basis of the differentiation of wholesale prices for crude oil for three zones. Maximum profitability is specified for regions that are promising in regard to recovery, thus providing for their preferential development. For example, the greatest profitability versus productive capital has been established for Glavtyumenneftegaz [Main Administration for the Oil

and Gas Industry of Tyumenskaya Oblast], and it exceeds that for the least profitable, Azneft', 9-fold.

The situation is similar also for gas prices. The profitability of natural gas in Tyumengazprom [Tyumen' Gas Industry] is double the industry average, and for casing-head gas in Glavtyumenneftegaz it is triple. In this case the enormous capital investment that has gone into the conquest of these regions has been taken into consideration.

The revision of wholesale prices will help most rapid realization of the 26th Party Congress's instructions to make the recovery of gas and oil in West Siberia and the transporting of them to the European part of the country the most important elements of the power-engineering program of the 11th and, also, the 12th Five-Year Plans.

At the same time, a unified wholesale price for the industry has been established for crude oil to the customers--all oil-refining enterprises--and also for crude oil destined for export. It is differentiated only as a function of the content of sulfur, water, salt and mechanical impurities.

Price differentiation stimulates intensive refining of the crude and a high yield of light petroleum products. For these purposes, higher profitability is specified for wholesale prices for high-quality crude.

Wholesale prices for enterprises for natural gas and petroleum (casing-head) gas provide for standard profitability for all gas-recovering associations, including those for which recovery volume has been reduced, taking into account the geological conditions that are taking shape. For associations that are functioning in more favorable natural conditions, fixed payments sent to the budget from profit in a rigidly set amount have been established.

In the work to improve price-setting in the fuel raw-material branches of industry, the instructions of the 26th Party Congress about improving the structure of the fuel-and-power balance and about reducing the share of oil as a fuel and replacing it with gas or coal have been considered. Thus, when establishing wholesale prices for gas, we proceeded from the need to provide for the effective interchangeability of fuel resources. Prices for gas for all industrial customers have been set lower than the price for mazut in all economic regions. On the average for the country, the difference is more than 20 percent.

Calculations indicate that use of the new wholesale prices will enable expansion of the recovery of high-quality types of raw material and the rational consumption thereof. As a result, in addition to the tasks set in "The Main Directions for the Country's Economic and Social Development," it will be possible to save about 100 million tons of standard fuel equivalent. Following are the components of this saving (in millions of tons of standard fuel equivalent):

--a change in structure of the distribution of various types of fuel by category of customer, primarily through the replacement of coal by gas for minor customers--20;

--an increase in the output of graded coal for customers with bed-type combustion of the fuel and in the replacement of run-of-mine coal by graded coal--20;

--a rise in the quality of solid fuel to an optimal level--15;

--the stabilization of quality of the coal sent to power stations--10; and

--the more complete use of secondary energy resources in industry--35.

The effective deployment of productive forces will promote the establishment of wholesale prices for fields of useful-mineral deposits that have promise for development but are not being developed yet. This practice will be introduced for the first time. Wholesale prices for promising fields will be correlated with existing prices and will be introduced where the wholesale prices for these useful minerals have not been established for the given region or where their recovery requires increased expenditures by virtue of the mining and geology conditions and other fields will not be able to provide the planned requirements. These prices are used in computations when assigning reserves of useful minerals to the inventory and when evaluating the economic effectiveness of capital investment of enterprise designs.

As experience indicates, the establishment of wholesale prices for new fields of useful minerals pays for itself. They represent national economic interests more completely than the so-called settlement prices and other prices set by branch-of-the economy institutes.

The Extraction of Useful Minerals in the USSR

Minerals	1970	1975	1980
Oil (including gas-condensate), millions of tons	353.0	490.8	603.2
Coal, total, millions of tons	624.1	701.3	716.4
Ordinary coal	476.4	537.6	552.9
Brown coal	147.7	163.6	163.4
Gas, billions of cubic meters	197.9	289.3	435.2
Iron ore, millions of tons	197.3	234.9	244.7
Manganese ore, millions of tons	6.8	8.5	9.7

The Drive Against Losses

An urgent national economic task of the 11th Five-Year Plan is the more complete use of natural raw materials. Right now a substantial part of the useful minerals taken from the ground go to the dump. Given the current state of equipment, this level of waste can be cut in half.

The new wholesale prices will raise the economic incentive for the integrated recovery and processing of useful minerals. The list of mined associated rock and of extracted raw-material components that are subject to payment has been expanded.

Also, increased rates for payments for exceeding the norms for losses have been introduced. They are now established at a level that provides compensation to the national economy for harm from above-standard losses of reserves of useful minerals during extraction. It is clear that the incentive value of such payment depends upon the substantiation of norms for losses.

Unfortunately, this stipulation is not always by far being observed. Thus, in the revision of wholesale prices for iron-ore industry products, it was established that, in comparison with plan indicators, a reduction in losses of reserves had been achieved here. But actual losses had grown in comparison with the 1978 level. An unsubstantiated increase by USSR Minchermet [Ministry of Ferrous Metallurgy] and USSR Gosgortekhnadzor in the standard for losses created an appearance of success.

Where there is a shortage of certain types of natural raw materials, an important trend in intensifying production is the use of artificial substitutes.

The wholesale price for natural and synthetic piezoquartz comprises, for example, given equal quality, 2,800 rubles and 100 rubles, respectively, per kilogram. The prime production cost of the natural piezoquartz is 25-fold the prime production cost of the synthetic variety.

Profitability as a ratio of productive capital is approximately equivalent. The specific capital investment per kilogram for the natural piezoquartz is 5-fold greater than for the synthetic. The established ratio of prices not only is an incentive for expanding production and using the synthetic raw material, but it also creates the necessary cost-accounting conditions for recovering the necessary volume of the natural material.

It is also possible by means of prices to economically motivate effective shifts in the production structure. The following example can illustrate this.

Under the new wholesale prices of 23.8 rubles per ton for agglomerate of the Kachkanar GOK [Mining and Concentrating Combine] and of 24.4 rubles for fluxing pellets, the attributed costs, which consider the effectiveness not only of the current expenditure but also of capital investment, are, respectively, 80.2 rubles and 78.4 rubles, respectively, for melting one ton of pig iron.

If, when melting the pig iron, the agglomerate and the fluxing pellets are used in equal amounts, then the attributed expenditures on the average per ton of pig iron are 79.3 rubles. With increase in the consumption of better quality raw material--pellets in the ratio of 3:1--the attributed expenditures are reduced to 79.2 rubles.

Based upon this ratio of agglomerate and pellets, wholesale prices have also been set for certain grades of metal, which will enable the price level to be reduced.

The USSR State Committee for Prices and its scientific-research institute, as well as branch of the economy institutes, are now doing further work to improve the methodology for setting prices, with a view to stimulating the rational use of raw materials.

11409
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MUBAREK GAS-TREATMENT PLANT CONTINUES TO EXPAND

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 15 Nov 81 p 1

[Article by Yu. Kruzhilin (Mubarek, Kashkadar'inskaya Oblast): "Mubarek's Rhythm"]

[Text] A new operating unit of the Mubarek gas refinery in the Karshi Steppe has been put into operation. This completed construction of the enterprise's third phase. Since the start of the year, three units with a total capacity of 5 billion cubic meters of scrubbed gas per year, as well as an installation for obtaining elementary sulfur with an annual productivity of about 300,000 tons, have gone into operation.

With startup of the third phase, the Mubarek Gas and Chemicals Complex will increase 1½-fold the delivery of fuel to the trunk pipelines that supply cities and villages of Uzbekistan, Tajikistan, Kirghizia, South Kazakhstan, the Urals and the European part of the USSR

I recall these places at the start of the 1960's. The wild, uninhabited steppe resounded with the roar of diesels. The unsleeping searchlights of the drill rigs awakened the dark night.

I recall the terrible year of 1964--a gigantic gas gusher tore from the ground at the Urtabulak exploration area. The stream gushed up with the roar of an airport or of thunder, under a pressure of 300 atmospheres. Only a force comparable with the desert's exhalation could rescue Urtabulak's riches....And such a force was found. On a gloomy fall day of 1966 the earth resounded with a muffled rumble and then a deafening silence fell on the plain. An underground nuclear explosion planned by Soviet specialists had cut the gusher at its roots and forever covered the malfunctioning wellbore over....And the geologists, drillers and recovery workers returned to their everyday jobs--undertaking development of the field and the erection of a new city in the desert.

Thus began the history of Mubarek. And now the construction of the third phase of the gas treatment plant has been completed here. The report of the state acceptance commission contains remarkable words: "A standard construction period cannot be stated because of the lack of an analog in world experience."

But the pace has been truly surprising. The first phase of the plant, with a productivity of 5 billion cubic meters of gas per year, was built in about 5 years.

The second one, of the same capacity--was built in 2 years. Back in January, the site of the third one was empty steppe.

Five years versus 10 months....A speedup by a factor of 6. How was it possible to do this?

Precision in the collaboration of clients, designers, suppliers and executors of the operations helped all the participants to compress the time. It became possible then to organize the simultaneous execution of a number of major work steps. For example, manufacture of equipment for the Mubarek gas-treatment plant's third phase began back when the complex was being designed. For this purpose, a client service--the plant's OKS [capital construction section] coordinated previously the products mix of the future industrial installations with the design institutes. And so the suppliers, primarily the Volgogradneftemash Association, obtained a reserve of time for rhythmic planning and execution of the order. Saratov's VNIIgazdobycha [All-Union Scientific-Research Institute for Natural Gas Recovery], the Podol'sk TsKB [Central Design Bureau] for Petroleum Industry Apparatus and other organizations designed the plant's third phase in such fashion that, though it has the same capacity, it occupies only a fraction of the area and consumed only a fraction of the metal required by the first phase. This promised the builders, who had gained much experience in the preceding years, new opportunities for speeding up construction.

And the prime contracting trust Mubarekgazpromstroy [Trust for Construction of Mubarek Gas-Industry Enterprises] did not overlook these opportunities. A severe personnel shortage (and this is understandable in a desert district) was compensated for by increased factory fabrication of parts and the introduction of effective operating methods. After concentrating the best reinforcement workers, they began to join the framework in centralized fashion and to deliver it to the site in finished form. Slipforms were used widely. And, where possible, monolithic reinforced concrete was replaced by the prefabricated product in order to lessen dependence upon deliveries of ready-mixed concrete. (Capacity for producing it in the Karshi Steppe is inadequate as it is.)

While the foundation pits were being excavated and the footings and columns were being erected, the equipment ordered had already begun to arrive. And Sredazneftegazstroy [Trust for the Construction of Oil and Gas Industry Enterprises in Central Asia] installers' brigades by no means waited for the builders to present them with a work front. At railside bases here they organized the prefabrication of various parts in units that weighed 50-60 tons or more. Again, two stages proceeded in parallel--construction and erection. Local assembly work more often than not was reduced to raising the finished units and joining the pipes.

In 10 years Mubarek has produced about 80 billion cubic meters of gas and more than a million tons of the purest sulfur, which has been recognized with the State Emblem of Quality. During the current five-year plan the young city's contribution to strengthening the country's economic might will increase precipitously. A fourth phase of the plant with a productivity of at least 5 billion cubic meters of gas per year, and still another installation--for obtaining 300,000-400,000 tons of sulfur--are to be erected, the water mains will continue to be extended, and a high-capacity heat and electric-power central will be built.

The young city has a great and good life ahead of it. It will grow just a bit away from the industrial zone, separated from the gas-treatment complex by a wall of greenery. It is not easy in the city: the demand for apartments is increasingly great, and the possibilities for the time being are not good. But already additional builders' brigades, materials, constructional structure and mechanisms are being transferred here. The Soyuzuzbekgazprom Association is concentrating in Mubarek all its resources in order to make next year a critical one in the rising pace of housing construction.

The word "mubarek" translates from the Uzbek as "congratulations." And it has its symbolism. Mubarek's builders and gas-field workers have proved convincingly their professional maturity. And this deserves the warmest response.

11409
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FUELS

CURRENT TECHNIQUES FOR STABILIZING AZERBAIJAN OIL RECOVERY DESCRIBED

Baku VYSHKA in Russian 15 Oct 81 p 2

[Article by G. Gumbatov, chief of the NGDU [Oil and Gas Recovery Administration] imeni N. Narimanov and candidate of engineering sciences, and R. Dadashev, chief geologist and candidate of mineralogical and geological sciences: "The Oil of the Baku Archipelago"]

[Text] In implementing the decisions of the 26th CPSU Congress and the 30th Azerbaijan Communist Party Congress, the collective of the Oil and Gas Recovery Administration imeni N. Narimanov, which developed the Sangachaly Offshore-Duvanny Offshore-Bulla Island (Baku Archipelago) field, recovered during the first 9 months of this year 42,800 tons of crude oil and 57.5 million cubic meters of gas above the plan. This means that fulfillment of the annual commitments adopted will proceed at a pace that substantially outstrips the deadlines. The administration was awarded the challenge Red Banner of the Ministry of Gas Industry and the trade-union central committee and given the first monetary prize.

The article published below tells how the offshore oilfield workers went on to success and what is being done at the oilfields today to increase well productivity and to extract the maximum amount of fuel from the earth.

Two years ago the NGDU imeni N. Narimanov collective was lagging and did not cope with fulfillment of the plan for recovering oil. A radical turning point in the collective's work was planned after the Azerbaijan Communist Party Central Committee deeply analyzed in 1979 the activity of offshore oilfield workers, including our administration, disclosed deficiencies in the use of reserves that existed at the fields and planned ways for eliminating them.

Our main growth, naturally, was obtained by improving work on the existing well inventory. During the first 9 months of this year, 193 geological-engineering measures were conducted under a plan for 168. This enabled almost 130,000 tons of additional oil to be obtained, testifying to the high effectiveness of the work done.

Much growth was obtained by introducing wells from the inactive inventory. Since the start of the year, five wells--one above the plan--have been introduced into operation after prolonged inactivity. From them 24,700 tons of crude were obtained.

In the socialist competition to meet ahead of time the goals for the first year of the 11th Five-Year Plan, the collectives of the oil and gas recovery departments under Magerram Akhmedov and Nadir Asadov especially distinguished themselves. Even during difficult weather, each group spent its time at sea in shockwork fashion.

Oilfield workers are toiling with care and purpose, trying to use reserves more completely. Two low-flow wells, Nos 287 and 349, are examples. After comprehensive study it was decided to perforate the fifth horizon of the productive stratum. The calculations proved to be accurate: the wells began to gush with a flow of more than 200 tons of clean crude each. Oil-bearing intercalations were discovered by means of pulsed neutron logging in another strongly water-encroached well, No 372, which was then brought into production. No 372 is now giving 35 tons of crude per day. High flows of fuel have been obtained for a group of other water-encroached wells.

The brigades of oil and gas recovery foremen Vel' Mustafayev, Mekhman Sadykhov, Namik Rafiyev, El'man Kambarov, Agasadykh Gasonov, Georgiy Nasibov, Asadulla Asadov and of well-overhaul foremen Rakhman Zeynalov, Magerram Kerimov, Dzhamaletdin Abdulmedzhidov and many others display a conscientious and honest attitude toward difficult duty.

In the drive to raise oil recovery, systematic execution of secondary and tertiary enhanced-recovery methods have played an important role. In accordance with a geological-engineering plan for the development of horizon No 7, for example, which was adopted in 1967, the main target for operation was to be waterflooded with the addition of surfactants (PAV's). It was recommended that a fringe of process or so-called active water be created around the injection wells; this would promote prolonged maintenance of their injectivity and high oil withdrawal at relatively small PAV expenditure.

Later, when the goal had been achieved, we converted to injection with the addition of sulfanol, only at those water-injection holes in the area where the deposit of horizon No 7 was not adequately covered by waterflooding. But because of the fact that the reservoir's rocks of this horizon were characterized within the area of the Sangachaly-Offshore field by very low physical properties, it was decided to continue to add sulfanol here also. This enabled the water-injection holes of the area to preserve their injectivity and the formation's energy to be stabilized for a few years. As a result, the average daily flow of most wells also stabilized, and in some cases even a growth in recovery was observed.

The effect obtained enabled the collective to proceed more skillfully to intense drilling-over of the target. Right now several wells more than 4,300 meters deep are being drilled at the Sangachaly-Offshore field. And there is every reason to consider that they will go into operation with adequately high flow rates.

At the same time, a study of water injection and of the oil wells indicated that waterflood coverage of the formation within the target being developed was very low, reaching an average of 15 percent. This led to uneven displacement of the crude from some intercalations and loss of a substantial portion of it. It was decided to correct the situation by the use of various polymers that are good water

thickeners. On the recommendation of AzNIPIneft' [Azerbaijan Scientific-Research and Design Institute for the Petroleum Industry], for example, the oil-soluble polymer polyisobutylene and the water-soluble polymers polyacrylamide and VNIIolefin were tried. In both cases good results were obtained: waterflood coverage was greatly increased and, consequently, the withdrawal factor rose.

Despite the fact that our field has been under development since May 1963, prospecting and exploration drilling continues intensively in both the northeastern wing of the storehouse and the southwestern wing. Now, in order to delineate the deposits already discovered and to establish new ones, work is being done on horizons Nos 7 and 8 of the productive stratum, the Podkirmak suite, and along the Oligocene-Miocene complex of sediments. Already this year, the borders of horizon No 8 have been extended as a result of the sampling of wells Nos 552 and 562.

In speaking about the collective's efforts to make maximum use of reserves for increasing the withdrawal of crude, the contribution that scientists and designers have made to increasing the effectiveness of developing the Baku Archipelago area must be noted. The Neftemash OKB [Special Design Bureau] collective in particular gave us great help. It managed to create in a comparatively short time gaslift valves of improved design that can be used reliably in wells more than 2,000 meters deep.

The first lot of valves of the new modification, which permitted wells to be mastered rapidly and effectively, was run down to 2,300 meters. Further tests indicated that this equipment possesses, so to speak, a reserve of strength. An excellent result was obtained at wells Nos 445 and 450, which are located at the first oilfield, where, for the first time in world practice of recovery, gaslift valves operated at a depth of 3,300 meters. The wells were completed in a few hours and went into operation with a flow rate of 55-60 tons of clean crude per day.

At the end of last year, at the scientific-research and production operations department of our administration, the laboratory for introducing the new equipment was expanded. Its collective, under experienced specialist Gusein Mamedov, proved that solution of the most complicated tasks are within its capabilities. With the direct participation of staff workers of this laboratory, we equipped more than 20 wells with gaslift valves in the first quarter of 1980 and the first 9 months of this year. This will enable the compressed gas and the compressor and pump pipes to be used more rationally, and the main thing, as was noted above, completion of the wells was accomplished in a short time after drilling and repair. We are counting on the installation of gaslift valves on 10 more wells before the end of this year.

Right now the laboratory's staff workers are testing with success still another Neftemash OKB development--a shutoff valve. This accessory is intended for those wells where high formation pressure creates great operating difficulties. At present, for example, we are compelled to hold constantly, around the clock, a plugging unit beside well No 300, which does not tolerate an increase in pressure in the annular space up to a critical level, which can lead to breaking of the string and to an open gusher. A test model of the shutoff valve proved itself well at Well No 325, where the pressure reaches 200 atmospheres. We think that we are obtaining fair results also at No 300.

At the same time, laboratory specialists are studying deeply the question of using cable equipment for seating and removing the gaslift valve. Such operations are already being carried out successfully, for example, at Tyumen oilfields at depths of 1,200-1,300 meters. We have to master this equipment at depths of 3,000 meters and more. Its use promises great advantages. While 3-4 days are now spent during well repair that involves change of the gaslift valves, this can be managed in a few hours with cable equipment.

The collective of the Sangachaly Offshore Drilling Administration, which celebrated the start of the 11th Five-Year Plan with high labor achievements, is extending tangible asistance to the NGDU in achieving good production indicators. The drillers coped ahead of time with the plan for turning operating wells over during the first 9 months of the year. All well completions were accomplished competently, with knowledgeability, and, therefore, they went into the administration's operating inventory with good flow rates.

It would be false, however, to presume that we have solved all our problems. Protracted idle time during well repair provokes serious anxiety. The fact is that 2 or 3 years ago AzINMash [Azerbaijan Scientific-Research Institute for Petroleum Machinebuilding] specialists developed an LR-10 type hoist for repairing deep offshore drilling. The Plant imeni Leyt. Shmidt fabricated a test model of it, the testing of which we conducted. During the test, no few design deficiencies were discovered. Much time has elapsed since then, but major interruptions still occur in the hoist's operation.

The repairmen also have many complaints against LPT-8 hoists, which are produced on the basis of the T-130 tractor. They are more powerful than the AzINMash-43P hoists, but they have important faults: the gearbox and starter break down frequently. As a result, 6 new hoists are idle right now. And this creates a serious disturbance in the overhaul brigade's work and prevents more complete use of reserves within the oilfield.

At a recent study in the school of scientific communism that Candidate Member of the CPSU Central Committee Politburo First Secretary of the Azerbaijan Communist Party Central Committee Comrade G. A. Aliyev conducts in our administration, it was correctly pointed out that there are no few deficiencies and miscalculations in the NGDU collective's work and that we still are not operating stably enough.

Communists and all oilfield workers of the administration are drawing the proper conclusions from the criticisms directed at them and are applying all their efforts toward achieving new, high labor goals in accomplishing the tasks set by the 26th CPSU Congress and the 30th Azerbaijan Communist Party Congress.

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PIPELINE WORKERS COMPLAIN ABOUT LACK OF SUPPORT

Moscow PRAVDA in Russian 4 Nov 81 p 1

[Letter by I. Shaykhutdinov, brigade leader of Tatneft'provodstroy [Tatar ASSR Oil Pipeline Construction Trust] and Hero of the Socialist Union; M. Buyanov, brigade leader of Sibkomplektmontazha [Trust for the Erection of Outfitted Modular Units], Hero of Socialist Labor and delegate to the 26th CPSU Congress; V. Tsvetkov, brigade leader of the Insulating and Pipelaying Column of Mosgazprovodstroy [Moscow Gas Pipeline Construction Trust] and Hero of Socialist Labor; B. Diduk, leader of a welders' brigade of Severtruboprovodstroy [Northern Trust for Pipeline Construction] and USSR State Prize winner; V. Barulev, compressor equipment operator of Tyumentransgaz [Tyumen' Association for Gas Transport] and Knight of the Order of Labor Red Banner and Emblem of Honor holder; and A. Sokha, gas-recovery operator of Urengoygazdobycha [Urengoy Gas Recovery Association] and Leninist Komsomol Prize winner: "Erect Gas Pipelines More Rapidly"; passages in slantlines printed in bold face]

[Excerpts] By the end of the 11th Five-Year Plan giant pipelines totaling more than 25,000 kilometers in length will stretch from the Tyumen' arctic to the Urals, the Volga and the Central Economic Region, and to the country's west. Compressor stations numbering 227 with a total power of more than 20 million kilowatts will be erected.

However, our efforts are being hindered by the lagging of certain enterprises and associations of the ministries of power and chemical machinebuilding and of other agencies that send equipment, fixtures and instruments. General construction work has been promoted at all the compressor stations on the Urengoy-Petrovsk gas pipeline. Barely enough time remains to complete them. But then the Leningrad Metals Plant's production-association collective has sent only 11 of 30 gas-pumping units, the Khabarovsk Power Machinebuilding Plant only 14 out of 20. The shipbuilders also are in arrears. They owe 10 units for the Sharan, Lyalya, Sokovka and Polyanskaya compressor stations. /The builders and gas-industry workers expect that these collectives, as well as the suppliers of the Salavat Machinebuilding Plant and the Ust'-Kamenogorsk Fixtures Plant, will make up for what has been neglected and send the missing equipment, fully outfitted and of high quality./

/Deliveries should be accelerated in the case of rolled metal needed for fabricating special equipment at facilities that are due for startup,/ from plants in Cherepovets, Kommunar, Rustav, Zhdanov and other plants, and from the Nizhnyy Tagil, Orsk-Khalilovo and Novokuznetsk combines.

Winter is making its assault, and this complicates the work very much. Working conditions in the Tyumen' North are extraordinarily difficult. Each step is difficult. And everything that can facilitate and speed up our work will be of meaningful help in developing the gas industry and will aid in fulfilling the increased commitments. Unfortunately, we still are not receiving pipe with plant-installed insulation, which reduces the work pace on the lines. /Ferrous metallurgy enterprises should at least convert from words to deeds./

Our collectives are expecting more active participation from rail transport workers, primarily those of the Sverdlovsk mainline, in this common matter. We understand well the difficulties that this railroad is encountering with an ever-increasing freight-traffic volume, but we still will ask them to /give the green light to freight for the Urengoy gas arterial./ Much depends also upon motor-vehicle and aviation workers. We value highly businesslike cooperation with the Tyumen' Regional Civil Aviation Administration. Helicopter and airplane pilots are doing much to avoid interruptions in bringing rotating-duty parties and mechanisms and equipment to the sections that are difficult of access. But right now, when hundreds of kilometers separate us from our planned goals, this help should increase.

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FUELS

TYUMEN' OILFIELD HELICOPTERS NEED MORE FUELING BASES, DISPATCHER SERVICE

Moscow VOZDUSHNYY TRANSPORT in Russian 15 Oct 81 pp 1 - 2

[Article by V. Solov'yev (Tyumen'-Moscow): "The Helicopter in the Role of a Tanker"]

[Text] Not long ago the CPSU Central Committee approved the initiative of Tyumenskaya Oblast workers to promote competition to recover 1 million tons of crude oil and 1 billion cubic meters of gas per day ahead of schedule.

Helicopter pilots are operating at one of the decisive segments of the work. They are actively seeking reserves for increasing the effectiveness and quality of the work.

Anatoliy Shevchenko persistently watched the machine and approached the flight mechanic Gennadiy Savkin.

"When can we take off?"

"We will be delayed for about 45 minutes. The long suspension cable is not ready."

The commander involuntarily made a wry face--for the technicians had been notified previously, but still the cable had not been readied. And the task is important: to help at a pipeline breakdown.

At a meeting yesterday Anatoliy had given assurances, in the name of the helicopter pilots, that they were doing everything necessary for successful operations by the oilfield and gas field workers. But now there is a delay here, and an hour of Mi-10k helicopter operation is not cheap.

They got to the prescribed pad in about 50 minutes. The mood in the cabin had changed. A shapeless black spot blurred the swiftly pushing pipeline. People bustled about, and a firetruck stood at the ready.

At first it was simple. They had taken a crawler tractor from the Nizhnyy Aremzyan settlement and moved it to the place of the breakdown. On the next trip they had gone for the shutoff valve. A fine, compact, attractive thing, of highly perfected design, which was comprehensible even to the nonspecialist, it lay neatly on the green grass. One would never think that there were more than 8 tons of it....But now it had been entrusted to them.

The Mi-10K's blades chopped powerfully through the warm haze, but the hot air, spreading the high grass at random, did not give the machine the proper support. The turbines operated to their limit, and everything possible was done, but nevertheless the helicopter, as if tied, strayed about the green meadow, not able to take off.

The pilots' faces tensed, and they tested the machine severely, almost beyond its capabilities under these conditions. The turbines howled as if they had given up, and an anxious silence surfaced in the cabin. The signal panel flashed: "Overheating of the intermediate gear box." The commander and the inspector--experienced pilot R. Konstantinov--exchanged glances. A command was given and radio operator A. Chikishev unhitched the load. The freed vehicle shot upward with relief.

"The gear box had to be cooled," second pilot Grigoriy Stepanov explained to me when we were on the ground. "Of course we could have gone to the base, but the shutoff valve will not be moved, where there are no roads, without us."

The helicopter made a circle or two and again hovered over the edge of the forest. They decided to change tactics, to try to take off along the road.

And again the load is on the suspension, the turbines howl, the grass spreads out and the helicopter slowly rolls along the road. Gradually the speed increases. Faster and faster and suddenly we take off with unexpected lightness above the road, above the taiga, and, it seems, above the whole sunny wide open spaces of the district....

Three times we have gone to Nizhnyy Aremzyan, moving mechanisms and equipment to eliminate breakdowns. The time flew by imperceptibly. And now it was time for fueling, and it was good that the base was not far away.

On another day, when the trip was to a remote part of the oblast, where there were no refueling bases, about two-thirds of the helicopter's useful load was fuel.

"It's a sort of kerosene carrier, not a helicopter," grumbled the pilots.

During the first stage of developing Tyumen, the arterial waterways were the only transport means. Therefore all the refueling stations were along the river, and flights into the interior were performed without refueling. The crew was compelled to take fuel for both directions, and this also meant a reduction in useful load and an overconsumption of fuel. Herewas a first important reserve for improving the work.

It cannot be said that nothing was done in this regard. With the arrival of the meridional railroad, a second chain of refueling bases began to be built. A portion of the work had been done with the aviators' own resources, but, basically, the clients are erecting the bases under a temporary scheme. In the opinion of deputy chief of the Tyumen' Administration V. Sidorenko, 1.5-2 years is needed to complete this work.

Well, and until then? Until then the helicopters are at times converted into flying tankers.

...We fly to Belyy Yar. On the external suspension is a wheeled tractor. En route we land at Sovetskiy, again for refueling. We ask for 6,100 kilograms of fuel. An opportunity to pause, to relax appeared.

Anatoliy Shevchenko leisurely took a stroll to a far corner of the helicopter pad. It was noticeable that 3 hours with a load on the external suspension is not easy on the pilots.

I involuntarily recalled the tractor, a stubborn pendulum riding under the helicopter, and I recalled tales about cargo that tried to act disobediently. The exterior suspension is a strict thing, and it requires real pilot skill.

I once asked Anatoliy--would he not like to fly on the passenger liners?

"Our work is more interesting! A helicopter in Tyumen' is not simply a transport means, but a direct production force. We also lay pipe and ride the pipeline, and we do installing work. The helicopter has a hundred occupations at least!" answered Anatoliy.

Shevchenko is a helicopter pilot by calling. He loves that type of machine, whether Soviet or foreign, and he can talk for hours about the load capability, the ceiling, and maneuverability....

True, it is not enough for a good commander to know the equipment. He must know how to work with people. Yesterday I observed a curious episode in a dining hall. The crew hurried, but the tables had not been cleared and there were no trays. One of the youths began to fret and he raised his voice. But Anatoliy intervened: "Stop! We don't need excessive negative emotions." He smiled charmingly, spoke jokingly with the girls and in a minute or two the question was resolved, and they sat down to dine.

But let us return to the subject of fueling up.

"The helicopter should carry cargo, not kerosene for its own travel, as we have been doing, and, even more so, it should not fly empty. But what happens today, for instance? On returning to Tyumen' we will fly more than 700 kilometers empty. There is so much talk about a joint centralized dispatcher service with the clients but things haven't budget a bit," said Shevchenko.

He was right--there had been no return cargo for Tyumen'. Without landing, we left the wheeled tractor in the rain. It now cost the builders 14,000 more, and we are turning to go back.

In Tyumen', as in no place else in the country, helicopters are being used widely. How is this expensive equipment being used? Here are some figures on the results of the second half of 1980.

Mingeologiya [Ministry of Geology], Minnefteprom [Ministry of Petroleum Industry], Mingazprom [Ministry of Gas Industry] and Minneftegazstroy [Ministry of Construction of Petroleum and Gas Industry Enterprises] enterprises hauled, respectively, 4,194, 4,022, 2,701 and 2,516 kilograms of cargo by Mi-6 helicopter per hour of flight time.

According to these agencies, cargo hauling per hour on the Mi-8 was 1,398, 1,305, 980 and 974 kilograms.

The statistics indicate that, under approximately equal conditions, the builders used helicopters 1.5-fold to 2-fold less efficiently than the geologists. And 700 kilometers of empty flights are reflected here.

As we see, there are reserves for using the equipment, crews and helicopter pads. No additional machines are required for realizing them, it is necessary only to use assiduously what one has at his disposal. And here everything comes down to a mechanism that is able to coordinate the agency interests of numerous clients and aviators with the state's interests. Talks have been going on about this for more than a year. Some proposed to create an interagency central dispatcher service--others to strengthen the role of the PANKh sections....A little is being done. By order of the commanders of aviation enterprises in Surgut, Nefteyugansk, Nizhnevartovsk, Khanty-Mansiysk and Ural, joint central dispatcher groups for aviators and representatives of the largest clients have been established. As deputy chief of the Tyumen' Administration V. Khritokhin considers, this will enable orders to be combined, full loading to be accomplished, and a more realistic plan for flights to be made up. The central dispatcher groups still are just gaining experience, says Viktor Ivanovich, but efforts in this direction must continue.

With time, of course, experience will be accumulated and disseminated. Well, and until then? Until then, Anatoliy Shevchenko's crew will fly the Mi-10K "flying crane" from Belyy Yar to Tyumen' without cargo.

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BRIEFS

OFFSHORE DRILLING PLATFORM LAUNCH--Baku, 22 Oct 81--At an erection site that stretches along the very edge of the sea, the command, "Launch!" spreads dynamically, and the winches begin to smoothly uncoil the steel rope that holds the enormous 2,100-ton framework of a future metallic island on the building slip. Today the second half of the largest platform in the Caspian Sea, which was erected 120 kilometers from Baku for the promising Oilfield imeni 28 Aprelya, was let down into the water. Basically new in design, it will rest on two pyramidal blocks that have been assembled over water 100 meters deep. Until now stationary oilfield structures have not been built in the Caspian at such a depth. During construction of the platform, from which 12 wells can be drilled, the degree of industrialization of the work increased greatly. The whole future island not only is born on shore but it also is being outfitted there with the drilling equipment; this formerly was performed at sea and required much time. On shore they will also assemble a three-story building with a helicopter pad on the roof, which will be raised above the platform's upper deck. The island's residents will live within it, and a dining room, a dispensary, a radio and other services are being placed in it. Mastery of the deepwater fields of the Caspian Sea will help to meet the goal set by the 26th CPSU Congress of increasing oil recovery in Azerbaijan by means of such platforms. [TASS] [Text] [Moscow PRAVDA in Russian 23 Oct 81 p 2] 11409

GAS INDUSTRY INVENTIONS PROGRAM--A couple of days ago a joint session of the boards of Goskomizobreteniy [State Committee for Inventions and Discoveries] and Mingazprom [Ministry of Gas Industry] was held on the topic, "On the Status of Inventors', Rationalizers' and Patent-Licensing Work in the Ministry of Gas Industry and on Measures for Improving It Further." It was noted that during the 10th Five-Year Plan the gas industry had introduced a system for planning patent licensing, 30 independent patent services had been established in the industry's enterprises and organizations, more than 1,000 persons had been instructed on questions of patent information and the development of inventions, and a collection, "Invention and Rationalization in the Gas Industry," was being published periodically. The number of inventors and rationalizers in the industry has increased, and more than 29,000 persons are engaged in scientific creativity. The number of applications they have submitted for inventions has almost doubled. In 1976-1980 about 700 inventions and 121,300 rationalizers' suggestions were used. The resulting savings were more than 200 million rubles. Goals for 1981 call for the introduction of 156 research efforts and the use of 282 inventions. At the same time it was noted that during the preceding five-year plan only 22.5 percent of the inventions were applied to production. The ministry still has recommended few inventions for patenting abroad and for inclusion in the plan for selling licenses. The USSR State Committee for

Inventions and Discoveries and the Ministry of Gas Industry adopted a joint decision to further develop inventors' and rationalizers' work and to overcome existing deficiencies. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 45, Nov 81 p 8] 11409

STEEL SHEET PIPE-ROLLING--Vyksa, Gor'kovskaya Oblast--In competing for a worthy greeting to the 64th anniversary of the Great October, the builders, installers and setting-up workers of the first phase of the new rolling department of the Vyksa Metallurgical Plant carried out their commitments--to produce multiple-layer pipe 1,420 millimeters in diameter by the eve of the holiday, during startup and setting-up operations. For the first time in the world, large-diameter pipe for oil and gas trunk pipelines that operate at a pressure of up to 120 atmospheres has been obtained from steel sheet. [A. Sokolov] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 6 Nov 81 p 1] 11409

KOMI GAS FIELD DEVELOPMENT--Vuktyl, Komi ASSR, 5 Nov--Oilfield workers of Komigazprom Association have drilled the first development well at a new gas storehouse. It is located 80 kilometers from the well-known Vuktyl gas-condensate field. After this field is mastered, it is planned to recover 2 billion cubic meters of the blue fuel annually from local ground and to send it to the Siyaniye Severa gas transporting system. The economic indicators for penetration of the association's wells have improved, thanks to conversion to the brigade contract. [A. Kurkov] [Text] [Moscow PRAVDA in Russian 6 Nov 81 p 3] 11409

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